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ORIGINAL PAPERS.

ETHOD OF TEACHING DOMESTIC NOMY IN THE LEEDS BOARD SCHOOLS.

By CATHERINE M. BUCKTON.*

n for coming forward on this occasion is t is thought some little experience may be hearing how domestic economy is taught ools of the Leeds School Board, of which r the last eight years been the sole lady where a practical scheme is now being n. In order to give some idea of the al work of the Leeds School Board I may hat it has 46 board schools, including 111 its in operation, that there are 29,485 n the roll, and an average attendance of And first, it is important to bear in mind I was elected a member of the Board in Education Code made no provision for lomestic economy. It was the subject I ly took up, with the hope of being able, to secure its teaching in elementary With the concurrence of my colleagues, girls were invited to attend, out of school ourse of lessons on the laws of health (*a*),‡ gard to standards, as I knew that intelli- cted children, to whom this instruction of most value, often leave school scarcely d or write.

he instruction orally, basing all I taught on rinciples, illustrated by experiments, dia- models, and anecdotes, such as I thought rest and attract the attention of children. n that my first reason for wishing to give e lessons was that I knew there was so ness, suffering, poverty, and death, caused ignorance of the laws of health. My ason was because I was so sorry to see y and unkindly human beings treat each also how cruelly poor dumb animals are aid I was quite sure that young people be cruel if they were made early to under- beautifully and wonderfully their bodies ; and that it was my intention to show dumb animals, though they cannot tell us they suffer, do suffer when they are ill- cause a great many of them are made as we are, and can feel like ourselves.

ny great aims was to interest the parents e children. I, therefore, as far as possible, y experiments with the most homely so that they could be repeated at home. estions, drawing attention to the facts of portance, were given to each child to be t home. I also found it a good plan to aloud before I began the lesson. The nguage was of course necessary, but when ord became indispensable, it was either a black board, or printed.

or instance, my first lesson, which was on the air we breathe, by stating that thousands of lives were lost every year in England, from fevers and diseases caused by ignorance of the laws of health. A printed sheet was suspended on the wall, giving the number of grown-up persons and children who had died in Leeds alone during the previous year from these complaints (*c*). I explained that the laws of health meant that people could not be strong and healthy without fresh air, pure water, cleanly habits, clean houses, clean streets, good drains, wholesome food, proper clothing, and temperance. I then told the children that the first law of health was, that we must have fresh air, and explained the nature of good and bad air by means of a number of simple experiments with oxygen and carbonic acid gas. The gas was carried to the lecture in glass bottles similar to these ; they can be filled at any chemists for a shilling and carried any distance (*d*). I only wish that on this occasion my audience had partly consisted of children, for then I would have given a sketch of my first two lessons on 'The Air we breathe' and 'Why we have Fevers, and the Germ Theory', in order to show how instruction on these subjects paved the way for all the sanitary information I had to give, and enabled the children to realise the dangers that arise from uncleanly habits, bad drains, crowded ill-ventilated dwellings, and how infection is spread. I found that the germ theory was easily explained by brewers' yeast, diagrams and simple experiments. The models and all I used at these lessons are lying on the table. The extent to which physiology should be taught in elementary schools is a very vexed question. For my part, I do not wonder that we school managers, who are in the habit of seeing the difficult questions put by examiners on the subject, questions which have no practical application to the requirements of daily life, acquire a great prejudice against its being taught. At the same time, I found it absolutely impossible to teach the laws of health without it. Without physiology I should have found it impossible to explain the reason why our organs are injured by bad air, stimulants, and impure water, or how the body can only be well nourished and kept warm by eating a certain variety of well-cooked food, and by the use of proper clothing. No woman can rear a healthy family and make small means go far without this knowledge. Those who have the care of animals should be taught something of their structure, if we are reasonably to cherish the hope of putting a stop to the enormous waste of life and property that now arises from ignorance and cruelty.

I found no difficulty in making them understand all this by giving the information in a popular form, and illustrating it by models. For instance, no word description would have explained to the children the necessity for daily ablution, with soap as well as water, unless they had first been taught the nature of the skin, and been made to realise the immense amount of poisonous oily matter that has to escape day and night through the pores of the skin. To do this I had glass models made of the sweat gland (*e*), and suspended two or three from a piece of cardboard, on which was a magnified drawing of the palm of the hand. Directly the children understood the nature of the skin, how air and water not only pass out but can enter through the pores, I was able to explain clearly how shipwrecked sailors can prevent themselves from dying of thirst by keeping the skin wet, as the water passes through the pores and leaves the salt outside. In short, I found no difficulty with the assistance of models, many of them very inexpensive, in enabling the children to grasp ideas of very difficult

*livered at the Albert Hall, June 16th, 1881, at the iomy Congress, and repeated by desire of H.R.H. ian of Schleswig-Holstein on June 23rd.

‡ etters refer to the table at page 6.

but very important physiological facts. As another instance, with this model (*e*), which is intended to represent an artery, vein, and capillary, I was able to show how the pure blood gradually becomes dark as it passes through the capillary, because the exygen and good blood have pased out to nourish the body, and the impure blood has taken its place and is mounting up into the vein, which will carry it, like a servant, I said, to the heart, to be pumped up into the lungs to be purified. This model also enabled me to explain the cruelty of exposing the chest, arms, and legs of infants and children, because cold closes those delicate little flesh pipes called capillaries; therefore, however well-fed a child may be, it will still be starved unless the nourishment the blood contains can get out to feed the different delicate growing organs. With the aid of this model I also explained what should be done to prevent a person from bleeding to death when an artery was cut. Then, again, I found that information as to how to restore anyone who had fainted, or bring back life to a drowning person, could only be thoroughly understood after the lessons on circulation and respiration, which were further illustrated by a model of the heart (*f*), and another model of the chest, with the heart in the centre between the two lungs (*g*). I hesitated a good deal as to showing the skull and skeleton, lest they should frighten the children, but was rejoiced to find that they proved only objects of interest.

I wish to draw the attention of my readers to a very compact food collection which, together with food tables, is inclosed in a glass case (*h*). It contains the component parts of one pound of the following foods:—flour, beef, tea, cocoa, milk, potato, and the constituents of eggs (*d*).

Without such a food collection as this no teacher, however able, could make a child understand that the same substance which makes the fat in our bodies and which keeps us warm, and the substance which makes flesh, nerve, and muscle are both to be found alike in animal and vegetable foods such as flour and beef, that some foods, such as flour, are dry and contain very little water, whilst others, such as fresh vegetables, (potatoes for instance), contain a great deal of water; and that in fresh vegetables (fresh fruits of course included) there is not only a great deal of water, but a substance which prevents the terrible disease, scurvy, to which sailors and others who do not eat fresh vegetables every day are liable. Food tables or diagrams such as these are also necessary to give the names of other wet and dry animal and vegetable foods; or the children would imagine that these substances are only to be found in those mentioned in the food collection. In describing the cause of 'rickets', for instance, I not only explained that the three substances which form bone are to be found in greatest quantities in flour, but I showed a bone which had been deprived of these substances so as to make them realise how the frame became weak instead of strong. I wish here to mention that I concluded my food lessons by drawing particular attention to the fact that the mother's milk is the only food which contains every requisite substance for the complete nourishment of infants, and by pointing out how important it was that the mother, wherever it is possible, should do her duty by supplying it.

And, lastly, I must bring under your notice a box which contains all the materials and diagrams with which I illustrated my lesson on 'Warmth and Clothing', published in *Food and Home Cookery*, the book that contains the course of cooking lessons adopted by the Board, and a small specimen outfit for girls. This outfit (*i*) I had prepared in the hope of introducing the excellent foreign custom of girls making a store of clothes to be ready by the time they go out to service. These clothes, I think, ought to be made in school time, and paid for gradually by investing pennies in our school bank. The box contains a doll, to enable the teacher to show a child what it should do in case its clothes took fire. My lessons on the laws of health, including the lessons on digestion and food, were followed by four demonstrative lessons in cookery, to teach the principles of heat to be applied in order to prevent waste of food, or their nourishing properties. These were given by the aid of my own cook, and a little portable gas-stove (*j*). I daresay there are many better, but the difficulty I had in inventing it led me to conceive the idea of fitting up class-rooms with the stove and apparatus now used in our board schools for teaching cookery.

The interest taken by the children was shown in many ways, but most practically by their regular attendance during all weathers. Half-timers, I was very sorry to see, fell off, owing to their being obliged to miss a great many lessons. It was a great satisfaction to find from the answers to the questions put at the end of each lesson, that the children had been able to grasp the facts of vital importance. Some of the most original compositions were written by a boy of nine. At the conclusion of the last lesson of my course, I begged the children to try to recall what I had said during these lessons on the treatment of animals, and read books on Natural History, which they could get at the Free Library, so as to be able to answer twelve questions (*k*) which would be given on the subject. For the best answers to these questions prizes were offered that year by the Royal Society for the Prevention of Cruelty to Animals, and it was stated at the public presentation that the description given by one boy of the horse's hoof, and cruel practices resorted to by grooms and blacksmiths, owing to their ignorance of its structure, would have done credit to a man. The boy was enabled to do this from having seen a beautiful model of a horse's hoof (*f*).

In 1876, when, please remember, I had been at work for three years, Regulations were drawn up in the Code for teaching domestic economy; forty hours being allowed for cookery lessons. The Board soon availed themselves of the regulations, allowing forty hours of school time for the cookery lessons to girls who had passed the IV, V, and VI Standards, by sending a certain number of them to the Leeds School of Cookery. This plan, however, proved ineffectual, owing to the cost, and the great distance the girls had to walk.

Though the sum charged for each lesson (6d.) was the lowest that any school could charge, unless of a charitable nature, six shillings a head for twelve lessons would have amounted to a very large annual sum, seeing that there were 3,014 girls in the prescribed standards.

After this experiment by the Board, of having cookery taught by an agency foreign to itself, had failed, the Board decided to try my scheme, which was, to have a corner of a class-room fitted up as a centre, with a cupboard (*l*) into which everything needed for practical lessons on cookery and cleaning utensils could be placed and locked up at the end of the lesson. It contains every utensil required by the cook to give her cleaning and cooking lessons, and a sink, plate rack, tap of water, three kitchen tables, formed by

placing the three lower cupboard doors, lined with leal, on tressels. A gas-stove (*j*), in the front of which meat can be roasted by a jack as in an open fire-place, a hook to suspend a pan, such as we find in cottage homes, good iron saucepans with bright lids that last a generation or two (*m*), instead of common iron ones that soon lose their tinning, a dangerous substance, owing to the lead it generally contains. As the stove moves on castors, the cook can stand behind it and face her pupils while she is cooking. The stove has a double case to prevent the heat from reaching the outer one, and the children from being burnt. The amount of gas it consumes is very small. There are two ovens, so that bread and puddings may be cooked at the same time, and the little glass windows enable the children to watch the bread rising without being obliged to open the door. I must now draw attention to the thermometer in one of the oven doors, as I have a few words to say about this little instrument, because I hear it frequently asserted that it is absurd to use a thermometer even in teaching cooks, much less children. I may say that my sole reason for giving the four demonstration cookery lessons was with the hope, as I told the children, of being able to teach them the first lesson a French girl receives, which is to cook *gently*, and that I intended to explain how the flavouring matter and nourishing properties contained in foods were injured, and a great amount of food wasted, by the English method of cooking in a great hurry, by placing saucepans on large fires to boil away instead of simmer. How could I have accomplished this difficult task without the aid of a thermometer? Directly I had made the children understand the meaning of boiling point my difficulties were over. I then showed how the most nourishing beef-tea is never boiled, but cooked in a jar or pan placed in a saucepan of boiling water, because it is impossible to make food cooked in this way come up to boiling heat. To show how wasteful a process *boiling* is, my cook prepared some clear stock with one pound of veal that had only *simmered*, and the same quantity of meat that had been *boiled* according to the receipt of a professed cook. The result of the first process was a good sized glass bottle filled with clear jelly, and all that remained of the last was a piece of gelatine the size of a penny piece! To prove how gentle heat will cook all kinds of food, I had a variety of foods prepared in a Norwegian stove, which is a wooden box lined with felt. After showing the proper heat of an oven for baking, or fat for frying, by a thermometer (*d*), I explained how they might discover the right heat without one, my object throughout being to teach the children how to cook well with a small amount of fuel, by forethought and knowledge.

I feel convinced that until lessons on gentle cooking are universally instilled into the minds of the rising generation by all who profess to teach cooking, we shall ever continue an ill-fed and thriftless race.

Negretti & Zambra now make thermometers suited for any English oven (*n*).

When our centres were ready, a special teacher of cookery was appointed. I then discovered that it was essential that the teaching should be systematic, and, therefore, wrote a course of practical lessons on the cleaning of kitchen utensils and cookery, with questions and receipts, which were published and submitted to the late Board for approval (*i*).

Skeleton Syllabus of Cookery Lessons.

1. How to lay and light a fire; clean flues.
2. Cleaning wooden utensils.
3. Cleaning iron, tin, and metal utensils.
4. Bread making; use of scales.
5. Bread making; tea-cakes; buns.
6. Grilling; boil and poach an egg; potatoes.
7. Roasting; boiling vegetables.
8. Baking foods; boiled puddings.
9. Pastry; Clarify dripping.
10. Frying.
11. Food for invalids not allowed solid foods.
12. Food for invalids allowed solid foods.
13. Soup without butchers' meat.
14. On boiling meat and preparing poultry.
15. Meat soup; pickled onions; cabbage; dried herbs.
16. How to make coffee, cocoa, and porridge.

NOTE.—Five of the difficult lessons are to be repeated, making 22 lessons.

The course of cookery instructions continues for a year, and consists of twenty-two lessons, given fortnightly, during the last hour-and-a-quarter of morning or afternoon school, thus occupying only twenty-nine of the forty hours allowed by the code for Food and its Preparation. The children receive *printed* receipts, which can be easily practised at home, and read by their parents and themselves, instead of their being required to scribble on a piece of paper, when they ought to be busy watching all the cook is doing. The food is always sold at cost price, either to the teachers, or in very small portions, if necessary, to the children, so that our cookery scheme is nearly self-supporting. The total expense of fitting up a corner of a class-room, including conveyance of gas and water to the sink, is £41. The expense is increased if the cupboard stands alone. It then requires sides, which would be unnecessary if it stood in a recess. Six centres were completed by the late Board in 1879, and four more have just been added, making in all ten.

I hope each of our forty-five girls' schools will soon possess a cookery cupboard of its own; 3,360 girls would then be able to receive a year's course of instruction if these class-rooms were used only six times a week for classes of fourteen in the morning and fourteen in the afternoon. Beyond that number, practice is to my mind impossible. With this provision, it would be possible to test the cookery instruction given to each girl, because an examiner could watch classes of this number prepare a dinner. The cost of fitting up forty-five class-rooms, including the food collections, would amount to little more than £1,800. One teacher manages our ten centres by visiting them fortnightly; her classes range from 20 to 50. The number who received instruction during the last half-year was about 900, and the cost per child per year, 2s. 3d. The lessons are partly demonstration and partly practice, but with classes of 40 the proportion of practice lessons must necessarily be very small. When a printed and systematised course of instruction is thus prepared by a School Board, managers become masters of the situation, have direct control over the expenditure, can see on visiting the schools whether the methods they have approved are carried out, and judge whether the children are well taught. The compactness of the apparatus enables the teacher to manage without any assistance.

In about a year after the cookery scheme had been fairly launched, the Board decided to appoint a lady sanitary teacher to give my course of lessons on the laws of health throughout our schools.

Fortunately, the sanitary subjects taught by me under the title of 'The Laws of Health' (*a*) proved to be substantially the same as those classified in the

code under the head of domestic cookery (*See* C, p. 5). My methods of teaching were also in accordance with those laid down by the Education Department.

The appointment of a sanitary teacher being the first of the kind ever made in an elementary, or, indeed, in any other school, two of the leading medical men in Leeds took the trouble to write me letters in support of it, which I read at the Board meeting when the matter was under discussion. As these letters are a very valuable expression of opinion, and bear on the Dwelling, a domestic economy subject of vital importance, I will read them. Mr. C. G. Wheelhouse wrote:—

Hillary Place, June 8th, 1879.

DEAR MRS. BUCKTON,—I have read your syllabus very carefully, and quite approve it in its general bearings. The kind of instruction which it contemplates is, in my judgment, exactly what is most needed amongst the wives and families of the working classes, and likely to be of far greater use than much of what is now taught. What, indeed, can be of greater value to a working man's wife than a knowledge of how best to feed, clothe, nurse in sickness, and protect from external evil influences the children it may please God to send her? One thing, which might be of essential service, might be added, viz., how to know when the sanitary arrangements of her house are perfect and when imperfect. For this purpose, a lesson or two on the most common defects in houses, and the best way to remedy them, would be of great value; and if, for this purpose, you could have a couple of model houses, one in which all the sanitary arrangements are imperfect, and another in which they are all corrected, you would be able to confer, by ocular demonstration, an untold blessing upon your scholars. Such models need not be costly, and would certainly be unique; and if the soil-pipes, traps, and drains could be constructed of glass, which could easily be done, more might be taught in a few lessons than months of mere oral teaching would inculcate. Few educated people know anything of these matters, and many, many lives are annually sacrificed to ignorance concerning them. You have my best wishes for your success in your endeavours.

The second letter was from Mr. Pridgin Teale, author of *Dangers to Health*.

38, Cookridge Street, Leeds, June 11th, 1879.

DEAR MRS. BUCKTON,—I have read very carefully your scheme for a course of lectures upon health for the Leeds Board Schools. I may say at once it commands my entire sympathy, both as to the matter you intend to convey and the method by which you intend to convey it. The knowledge imparted will be of a value to the individual in after life hardly second to any that is acquired in our schools, and may become of unspeakable value to the community by teaching the mothers of the future how they may guard their children against avoidable illness and weak health, and by teaching the artizans of the future, the masons, the bricklayers, the joiners, and the plumbers, how much of life and death, illness and health, of others depends upon the quality of their handywork, and even upon their intelligent knowledge of the mechanism by which faulty workmanship opens the door to disaster. Another advantage, which may be hoped for as a result of those lectures, is the realisation by those in charge of children of the great responsibility they bear in reference to the health of those under their charge. Schoolmasters and schoolmistresses may learn that a child that looks amiss is practically ill, and, testing it by means of the thermometer, may send back home a child sickening with scarlet fever or measles, and save the school a whole day of exposure to contagion. School teachers may then learn the iniquity of boxing a child's ear when they understand the danger of producing deafness, the cruelty of punishing a child for carelessness when its sight is defective, for inattention when it is dull of hearing, for indolence when its brain is exhausted and needing rest.

After the selection of a sanitary teacher, I carried out a long-cherished plan of having made two model houses (*c*). The model of a 'sanitary' house is one of a row of working men's houses built according to the Leeds Building Bye-Laws, and, I am informed, on sound commercial principles, at a rent of about 5s. 6d. a week. On examination of this house it will be found that not an inch of space has been wasted, no drain pipes or traps within its walls; through ventilation in every story. One large living room, with a small room at the back fitted up with water, sink, bath, and set-pot, three bed-rooms, with open fireplaces, and separate well-built flues, and the walls all coloured with distemper, instead of being papered. With such a model how much might be done by a teacher to improve the taste for decoration, and, above all, show the necessity for cleanly habits without which a house though standing alone on the healthiest common, may become a fever den, and the best sanitary arrangements rendered useless. It is wonderful how girls and boys coming, as they generally do in London, from homes consisting of one or two rooms, ever become fitted for domestic service. The other model of an 'unsanitary dwelling' is interesting as well as instructive, because it has a history, being an exact copy of one of a block of back-to-back houses in Leeds built not more than twelve years ago. The rent is 4s. 6d. a week. Although this house has a fair exterior, it contains nearly all the worst sanitary defects to be found, equally in the houses of rich and poor. The working man who constructed it under the model maker lived in it for seven years, during which time his family and himself were never well. After the death of his little girl from fever they left it. The mother also confided her sad story to me, and concluded by saying if she had only known that their sickness was caused by the drains she would have persuaded her husband to have taken another house long before, 'and then,' she said, 'our little one might still have been with us'. This and many other sad experiences have made me more anxious than ever that sanitary instruction should be afforded to the children of the working classes—the girls especially—which shall make them realise the dangers to health that arise from living in ill-built, dark, damp, unventilated houses, and the diseases caused by sewer-gas and decaying organic matter; for it is the mother and her children who are exposed both day and night to these dangers. Nothing would spread greater terror among unscrupulous builders and landlords than the conviction that the working classes were being instructed to understand the nature of scamped work and the penalties inflicted by law on those who infringe on the Building Bye-laws.

The Leeds sanitary teacher will give her lesson on the 'Dwelling' after the two first lessons in the course on the Laws of Health which treat of 'Air and the Germ Theory', and the 'Management of the Sick Room', because the children's minds will then be able to appreciate the qualities of the good house, and realize the horrors of the bad one.

If we look at the order in which the Domestic Economy subjects are placed in the code, we shall see that 'The Dwelling' is the first on the list (B), but the code allows that the three stages of these specific subjects, except literature, to be taken in any order.

(B.)—SUBJECTS CLASSIFIED IN THE NEW CODE UNDER THE HEAD OF DOMESTIC ECONOMY.

First Branch.

1. Clothing and *washing*.

2. The dwelling: warming, *cleaning*, and ventilation.
3. *Rules for health*; the management of a sick-room; *cottage income, expenditure*, and savings.

Second Branch.

Food: its composition and nutritive value. Food: its functions.

Food: its preparation and culinary treatment.

(C)—Domestic Economy in Leeds Board Schools comprises the following subjects:—

Fresh air.	Good drains.
Pure water.	Proper clothing.
Wholesome food.	Temperance.
Clean houses.	Cleanly habits.
Clean streets.	

The subjects not treated by me are printed in italics. I do not see how a girl can either be taught how to wash clothes, or the duties of head or under nurse- or house-maid by the aid of text-books.

The sanitary teacher accomplishes her work by the following arrangement. She visits each of the centres once a fortnight, and gives an annual course of twenty-two object lessons which enables the board teachers to prepare their scholars through reading books to pass an intelligent examination in Domestic Economy and applied Sanitary knowledge. One set of models, diagrams, etc., is sufficient for all our schools, as a boy is employed who always attends the teacher, and either carries or conveys by a specially arranged hand-cart the apparatus required. The lessons (which are the same for a fortnight) occupy not more than three-quarters of an hour, and are given in three or four schools daily. The attendance varies from 17 to 108. The teacher could instruct a class of 200 or more. The total number now under instruction is 2,600.

The sanitary and cooking courses of twenty-two lessons each would together only occupy forty-three hours, only three hours more than the time allowed by the code for cookery alone, if a class room in each school were fitted up with a cookery cupboard, for by this arrangement no school time would be wasted in walking a mile or two to a centre, a most important advantage to all children, and especially to half-timers.

The sanitary and cooking instruction together costs much less than twelve lessons at the Leeds School of Cookery, who charge the lowest possible sum of any society, excepting those of a charitable nature.

I am aware that many persons will be opposed to this scheme, on the ground that it could not generally be adopted, owing to a deficiency of qualified teachers. Ten years ago I might have held this opinion, but not now, when a sanitary enthusiasm has arisen and created so many valuable societies throughout the kingdom, whose work is to enable educated women to qualify themselves to become sanitary teachers of the wives and daughters of the working classes.

London, Liverpool, and other large towns have their 'Health Societies', and Leeds a 'Ladies Educational Council'. Mrs. Spencer (the Leeds sanitary teacher) was led by circumstances five years ago to wish for some definite occupation, and, having a taste for sanitary matters, she attended a class on the 'Laws of Health' cookery and the constituents of foods; gained a scholarship offered by the Ladies Council, and was engaged by them to give a course of lessons to working women. She also attended an ambulance class, and passed an examination in nursing and first aid to the wounded. This lady was finally appointed sanitary teacher to the Board (at a salary of £100 per year). It must be remembered that the Leeds teacher is not required to organise the work or prepare the information. With regard to the questions given to the girls at the end of each lesson, several of the teachers have acceded to Mrs. Spencer's suggestion that their pupils should answer them in school as a composition lesson.

To prove how popular these lessons are, I need only say that some teachers, when they wish to punish their pupils, will not allow them to attend the lessons, which the children complain are too short.

Parents also take the greatest interest in these lessons. A father was heard to say that it was wonderful how much his children learnt—it was Mrs. Spencer at breakfast, Mrs. Spencer at dinner, and Mrs. Spencer at tea. One girl declared that her mother would always spare her to go and hear Mrs. Spencer, because they were not lessons. Miss Pechey, the lady doctor in Leeds, told me that she often met with proofs of the good that was being done by this wise appointment. As an instance, she said she had been called to attend a girl who it was feared had a fever; on finding that every precaution had been taken to prevent the spread of infection, she could not help expressing her satisfaction and surprise to the mother, who said 'Oh! don't you know that my daughter attends Mrs. Spencer's lessons and learns all these things.'

I need not tell anyone that it would be impossible to teach a child, or even the cleverest grown up person, cookery and the other subjects mentioned in the Code as domestic economy, simply by means of rules, receipts, and information culled from text-books, yet this I understand is the only method by which it is taught in all the training colleges and elementary schools throughout the kingdom, except in a very few schools where cookery lessons are given. I learnt this astonishing fact long ago from a School Board manager, who told me that he objected to our method of teaching this subject in the Leeds Board Schools, because it was not taught in this way in any other elementary school. The Education Department, he told me, did not require it, because children who had only been taught by reading books passed their examination in every subject, including cookery, and gained a Government grant.

Now, this state of things is not only very demoralising to our teachers, but it involves the absolute waste of public money. Though I fully realise the immense difficulties with which the Department is surrounded in dealing with domestic economy, I still hope it will eventually be thoroughly taught in elementary schools, not as a specific subject, allowed only where girls have reached a certain standard, but as an essential part of all elementary teaching.

The only way I can suggest for overcoming these difficulties, is to discover some inexpensive and practical method of teaching it, and then to withhold the grant from those schools where these methods are not carried out. Lest all my readers should not understand the difference between class and specific subjects, I may just explain that class subjects are the subjects such as grammar and analysis (whatever that may mean) which are taught to children in first, second, and third standards, while they are learning the essentials, viz., reading, writing, and arithmetic.

A teacher is obliged to present every child who is taking a class subject for an oral examination, provided it has attended school for a certain number of times (250) during the year. A grant of two shillings is awarded for each child, according to the average number of children in attendance throughout the

year. With regard to specific subjects, teachers may teach them or not, just as they like, and even if a child has been under instruction, should it not be found likely to pass its examination so as to gain a grant, the teacher does not present it. The examination is a written one, therefore not only the cleverest children will be selected for specific subjects, but only those who can spell and write well.

Now my desire is that every child should learn domestic economy before it leaves school, because I know it is the only chance a girl, from a poor home, will ever have of learning it. A working man's daughter often minds the baby, cleans the house, and nurses her mother, at ten years of age; directly she has arrived at that age and passed the Fourth Standard, she may become a half-timer, if her parents are poor, in order to assist her mother or gain her bread. The unavoidable irregularity of attendance of half-timers, prevents, as a rule, their being selected by the teacher for specific subjects. I therefore wish that children, when they are nine years of age, should have a year's course of training in domestic economy, including cookery, be examined orally or by paper, according to their ability, instead of learning grammar, a class subject generally taught before that age, from eight to nine, and after the Second Standard has been passed.

My experience proves to me that this course of instruction increases the intelligence and a desire for learning; it would therefore be a great aid in teaching reading, writing, and arithmetic. Boys are always in my thoughts when I speak on this subject, but the Education Department, I regret to say, has not remembered them. The laws of health applied to the care of men and domestic animals is surely as essential a subject to them as to girls. Should practical cookery lessons be impracticable? I know from experience that it is quite possible to give demonstration lessons by means of a small portable apparatus. An American gentleman who was present at one of my lectures, said, that it was impossible to conceive the blessing such knowledge would have been to the soldiers during the American war in which he was engaged, and I am sure no men require this instruction more than sailors, emigrants, and all who have the care of domestic animals.

BOOKS AND APPARATUS MENTIONED.

(*a*) 'Health in the House.' Publishers, Messrs. Longman and Co., London, E.C.
(*b*) Marshall's Diagrams, on rollers, largest size, £1 1s. each. Messrs. Chapman and Hall, 193, Piccadilly, W.
(*c*) Model of Sanitary House, £5; Unsanitary House, £4; or both, £8. Mr. William Rawlinson, 11, Hyde Park Road, Leeds.
(*d*) Frymometer, 3s. 6d. Messrs. Harvey and Reynolds, Commercial Street, Leeds.
(*e*) Glasswork Models. E. Cetti, 11 and 31, Brook Street, Holborn, London.
(*f*) Model of Heart, 50 fr.; Horse's Hoof, 50 fr. Dr. Auzioux, Rue Antoine-Dubois, Paris.
(*g*) Chest with Lungs and Heart (movable), £2 10s. Messrs. Rumme and Stodtman. English agents, B. W. Hedley and Co., 76, Mount Preston, Liverpool.
(*h*) Case for Components of Foods and Diagrams, £1 5s. 6d. Messrs. Illingworth, Ingham, and Co., Wellington Street, Leeds.
(*i*) 'Food and Home Cookery' (p. 11). Publishers, Longman and Co., London, E.C.
(*j*) Cooking Stove and Fittings. C. Wilson, Carlton Works, Woodhouse Lane, Leeds.
(*k*) 'Health in the House' (p. 199).
(*l*) Cookery Cupboard, without sink, pipes, or fixing, £8. James Wood, St. Columbia Street, Leeds.
(*m*) Pans. Messrs. J. and J. Siddons, Birmingham, or through any good ironmonger.
(*n*) Thermometer. Negretti and Zambra, London, or C. Wilson, Woodhouse Lane, Leeds.

THE SANITARY STATE OF ROME.

By LAUCHLAN AITKEN, M.D., F.R.C.P. Rome.

I.—THE DEATH-RATE.

AT no time has the sanitary reputation of Rome been good, but of late years, and particularly in England and America, most persistent attempts have been made to paint it in the blackest of colours. So much, indeed, has it become the fashion to write and to speak of its unhealthy state, that to many the name seems only to recall the most vivid ideas of danger and disease. The most sedate compiler of guide books vies with the most sensational of novelists in the condemnation of a climate which instils its fatal poison with every breath we draw. Poet and moralist alike exhaust their imaginations in finding strong enough terms for their vituperation of its languid atmosphere, whose vital principle has been used up long ago, for their expressions of disgust at its centuries of organic decay, and for their abuse of its ruins and its villa grounds, with groves of ilex and of cypress, straying down whose glades 'fever walks arm in arm with us, and where death awaits us at the end of the dim vista.' No one has probably written any novel about Rome of late years without making the hero or heroine a victim of its detestable climate. The natural result has followed, and there is probably, in Europe at least, no city the traveller visits with so much dread as Rome. All he has heard, every author he has read, have convinced him how foolish he is in yielding to the fascination the name seems to exercise. And yet his anxiety seems most warrantable, for, if we watch his progress, we see how the general but vague belief in the unhealthiness of the place, with which he left home, takes a firmer hold as he hears Roman fever made a constant subject of conversation in the health resorts of the Riviera, though he is only thoroughly awakened to his danger in the cities of Northern and Central Italy by grave assurances that fever is then raging in Rome. And let not the ingenuous stranger believe that this is true only in his own case, for year after year the residents in returning hear the same stories from the same lips, until cicerone, shopkeeper, and landlord begin to recognise them. What Roman resident of any standing does not recall the grave warnings he received at Cannes, at Nice, at Mentone, as to the dangers of the recent excavations in Rome, the solicitude expressed in Genoa or Venice lest he should select some particularly unhealthy hotel, or the solemn assertions of the Florentine innkeepers as to the exact number of victims already taken that season to the English cemetery at the Porta San Paolo. And as if all this were not enough, the finishing touches are given in Rome itself. In the Hotel salon or at the table d'hôte, in the club or reading room, the visitor finds many others whom the constant repetition of such tales and warnings has made as nervous as himself. In society the conversation invariably runs on what has been seen or done, and on the precautions which, he is assured, are essential to sightseers. In such coteries the slightest indisposition is eagerly commented on, and a serious illness affords an admirable opportunity for invectives on the place and its climate.

What wonder then that even the strongest minded stranger, when thus alarmed, finds his pleasure marred, his rest disturbed, and his vitality so lowered, as to predispose him to become a proper subject for the very evil he dreads. Unable to shake off the dominant idea, he forgets to notice the healthy aspect

of the native population, expresses surprise at the light-heartedness of the Romans, and breathes freely again only when the city on the Tiber has been left far behind him. Surely there must be some foundation for such a firmly rooted belief, for so much abuse, for such strong expressions as are so often used in speaking of Rome and its climate, beyond what prejudice, ignorance, or self-interest severally inspire. To enquire fully into the subject would, however, take us too far. The volumes written on the climate of Rome and the Campagna form in themselves a library. It is sufficient, at present, to show what the mortality of Rome is, what are its prevalent diseases, and in what manner visitors are likely to be affected by them.

In examining the question in this aspect it must be borne in mind that no proper data existed before the entry of the Italians in 1870. The Papal authorities did make returns from one Easter to the other, but as these were based upon an insufficient census, dating from 1853, it is certain that the results arrived at were of little value. After the destruction of the Temporal Power the Italians took some time before they got into working order. A registration office was established at the Capitol in the beginning of 1871, but the census was not taken until the last day of that year, and was admittedly defective. It is likely, therefore, that the calculations were only approximately correct for some years after the census, or, at least, until the number of those who had escaped registration was materially reduced. By 1875 the office was probably supplied with fairly accurate returns, and for comparison the quinquennial period 1875-79 ought to give sufficiently trustworthy results. And here we meet with a difficulty, as the mortality estimated by the Roman authorities and by the English Registrar-General is by no means the same. The accompanying table shows how materially they differ.

Year.	Deaths per 1000.		Average Population.
	Roman Municipality Calculation.	English Registrar-General.	
1875	30.3	36.1	259,290
1876	28.3	35.7	267,494
1877	23.4	30.4	278,409
1878	22.9	29.3	286,952
1879	22.4	29.0	295,000
Mean of the Quinquennium.	25.4	32.1	277,429

Such a discrepancy is very startling, and arises from the fact that in the municipal returns the calculation is made after the deduction of the deaths among non-residents, while the English Registrar-General includes those deaths, pursuing, no doubt, the same plan as he does for ascertaining the average death-rate in large English towns. But in Rome the mortality among those not included in the fixed population is very great, and the arguments advanced in favour of the exclusion of such deaths have some weight; for every certificate of death, when brought to the Capitol, is at once compared with the register to see whether the name is included in the fixed population, and, if we take the year 1878 for instance, no fewer than 1,857 out of 8,429 deaths registered in that year were not so included. The Roman officials, deducting this number, make the death-rate 22.9 per 1,000; the English Registrar-General would make it 29.3. It is therefore necessary to examine such returns more closely.

Out of the 1,857 deaths of non-residents in the year mentioned, 1,272 were in the hospitals, 90 in the Foundling Hospital, and 130 in the Campagna, where the people are nearly all peasants. It is clear, therefore, that these 1,492 deaths were amongst the poorer classes, almost all, in fact, having been those of agricultural labourers, who form a migratory population, coming at regular seasons to till the soil or to reap the crops they have sown. Their number is calculated as 42,000 annually. This, of course, is only approximately correct, but, considering the extent of the Agro Romano, and that its fixed population, as ascertained at the last census, taken in mid-winter when no work is going on, is ridiculously small, it cannot be very far from the truth. Although these labourers only spend a part of their lives on the Campagna, yet the mortality is very high amongst them, as much in bad, *i.e.*, very malarial seasons, it is believed, as 1 in 10. And, indeed, the life these unfortunate peasants lead sufficiently explains this enormous death-rate. Coming from comparatively healthy parts of the Abruzzi, the Sabine Ranges, and the Alban Hills, they are engaged by the landed proprietors and farmers to act as shepherds or farm labourers. As their nourishment is often contracted for by men who wish to make a profit out of it, they are badly fed, living on sour bread, cheese, a little bacon, and some poor vegetables, with wine, acid as vinegar, to drink. Frequently unable to find shelter in the scattered barns and huts which exist, exposed all day to a broiling sun, they throw themselves at night fall on the ground, without other covering than the scanty rags they own, to fall into the deep sleep of bodily exhaustion that almost inevitably entails their seizure by the malarial fevers which prove so fatal to them. When once attacked there used to be no nearer refuge than the hospitals of Rome, and many a visitor to this city must have noticed, with horror, the cabs and carts conveying these poor 'slaves of the soil' to the Santo Spirito Hospital, which they would enter, when moribund, only to swell its death-rate. Some slight attempt is now being made to improve their lot, as the municipality has lately added several medical stations to those already existing, raising their number to sixteen in all, and, what is more to the purpose, providing them with a small reception house for urgent cases, where the doctor in charge can supply medicine, food, and temporary shelter until he can send the patients in proper ambulances to Rome.

It is not, however, such workers in the Campagna only whose deaths are deducted in estimating the mortality of the fixed population. The rapid development of the city since 1870 has attracted an army of labourers, masons, bricklayers, artisans, and Government servants, whose names only too frequently escape registration. Many of the deaths amongst them occur in the hospitals; and in the Foundling Hospital, also, the number of infants, not belonging to the community, who perish annually is by no means insignificant.

But although the hospitals supply by far the largest quota to the death-rate among non-residents, yet, in the same year,—1878, 365 unregistered persons died elsewhere in the city. The annual mean number of visitors to the principal hotels and pensions is estimated as 40,000, without private houses being taken into account. Of these, some 16,000 are foreigners, and in 1878 thirty-four persons of foreign nationality died in Rome. There remain 331 deaths occurring among Italians who were either visitors to the city, or who had escaped registration, and whose circumstances had not compelled them, when ill, to take

refuge in the hospitals. The municipal statisticians would therefore add 82,000 to the population if they included the deaths of non-residents. Now it is certain that the average duration of the stay of such non-residents is much under a year, and such a calculation would err as much in one way as that of our Registrar-General does in the other. Still it is obvious from the facts mentioned, that the deaths among those not included in the fixed population are, and must continue to be, very numerous, and though it may be difficult to form a just estimate as to the addition required, yet some correction of population is necessary, as conditions similar to those existing in and around Rome do not occur elsewhere.

But even taking the mean between the calculations of Rome and of London, the death-rate, 28.7 per 1,000 for the quinquennium, is still very high. Climate, of course, is responsible for a certain part of the excessive mortality, as it is impossible that a city, such as Rome, which is nearly sub-tropical, can ever have the comparatively low death-rate of London or Edinburgh. The quinquennium, too, may not turn out to be an average one. The great influx accompanying the entry of the Italians, and the proclamation of this city as the Capital in 1870, caused much overcrowding, and for long there was quite insufficient house-room for the new comers; the addition to the population since these events having been nearly 100,000. The municipality has found great difficulty in inducing companies and contractors to undertake the construction of houses for the working classes, who, besides being badly fed, the price of provisions having risen proportionately more than wages, probably at present pay more for worse accommodation than they did under the old *régime*. Almost all the sanitary work, such as the paving of streets, the making of new sewers, and the repair of the old ones, the white-washing of houses, and the improvement of the general scavenging, has had to be done in the decennium, as it need scarcely be said that hygiene was the last thing thought of by the former ultra-conservative rulers of the city. The after-effects, too, of the disastrous flood of 1870 were long apparent in the death-rate of those parts which had been inundated. It is probable, therefore, that all these circumstances have told in producing a higher mortality in the years just passed than is likely to occur in those to come.

THE PRESENT STATE OF THE SEWAGE QUESTION.*

By PROF. CORFIELD, M.A., M.D. OXON., F.R.C.P. LOND.,

Professor of Hygiene and Public Health, University College, London, etc., etc.

PROFESSOR CORFIELD said, in commencing his lecture, that there can be no doubt that the question of the removal of refuse matters from the vicinity of habitations is, and always has been, one of the most important of sanitary questions. In every large community where we find a slow removal of refuse matters of human beings, there we find a high death-rate, and wherever we find improved means for speedy removal, there we find a proportionately lower death-rate. This was shown to be the case, in a remarkable manner, by the researches published in the ninth report of the Medical Officer of the Privy Council; in every town where the refuse matters had been removed more speedily, the death-rate was lowered; not only the general death-rate, but the death-rate from enteric fever and cholera, which are spread especially by this means. Before this, it had been noticed that cholera spread in filthy places; many witnesses before the Health of Towns Commission gave the most definite evidence that cholera spread wherever filth was kept, where the removal of refuse matters was not carried out thoroughly and quickly. The same was found to be the case in the time of the black death of the fourteenth century. If we read the accounts given of the streets and the houses at that time, we shall not wonder that the black death spread as it did; so it was with the Oriental plague in succeeding centuries. The fact that the Oriental plague now no longer appears in Europe, there can be no doubt, is due to the improved sanitary condition of the various towns in Europe. The fact that Constantinople is no longer a hot-bed of Oriental plague, is put down to be due to the improved sanitary condition of that place. I think there can be no question that several of these plagues of the middle ages, of some of which we know very little, spread more especially on account of the non-removal of filth. This is a fact, the importance of which, has only been recognised during the last few years. I was very much struck with a remark that Dr. Acland made to me the other day upon this subject; he said, 'What do you think was the cause of the depopulation of so many of the cities of antiquity?' 'I think it was pestilence rather than war', and I think there can be but very little question when you read the accounts. Why! the black death not only decimated towns, but almost entirely depopulated whole places, so that large and populous towns were left little straggling villages. I think you will be disposed to agree that it is not unlikely that many of the great cities were entirely depopulated in this way, and were lost, so that in some cases even their site is not known.

Having said thus much on the importance of the removal of refuse, I need hardly perhaps say that in the consideration of refuse matters, removal is the most important matter; they spread diseases in various ways, and the first thing we have to contend with is their removal. We want to get rid of them, and after we have got rid of them, we may consider what we can do with them. As to the value of human excreta as a manurial substance, various authorities have put it at various sums, but an amount that is very usually accepted is, that the liquid excreta of an individual are worth 7s. 3d. a year, and the solids 1s. 3d., making together 8s. 6d. The amount given by Messrs. Lawes and Gilbert is 6s. 8d. Probably these are both too high values, when you put the matter to a practical test. Scarcely any manure will sell in the market for what it is theoretically worth in the laboratory. Dr. Voelcker, in his remarks on the value of farm-yard manure, comparing it with the value of artificial manure, gives his decision, that it is worth about one-third of what is theoretically given to it in the laboratory.

There are, and always have been, a very large number of people who put the cart before the horse in these matters, who try first to see how much they can make out of this refuse matter, how much money they can save to the rates; that is the first thing they consider, and they put the first and most important thing second. Now that is a very great mistake indeed. The first thing to do with these refuse

* An Address delivered at the monthly meeting of the Sanitary Institute of Great Britain, June 21st, 1881.

matters is to get rid of them; they are a nuisance, they cause a high death-rate. When we have got rid of them, then we may try to utilise them, and to make money out of them, but not till then. Now we come to the methods by which these matters are being dealt with. I shall divide them into two kinds. The first are commonly called the 'conservancy' methods; they are called so, curiously enough, by their friends; I think it is a name that might have been given by their enemies, for of all things, *conservancy* of these matters is what we do not want. The second kind is the water-carriage system. There are really only these two methods.

The methods of conservancy or dry-carriage are of two sorts; the first being simple methods by which these matters are collected in or about habitations without any admixture whatever, and the second when these refuse matters are mixed with various substances to absorb their moisture, to deodorise, or to disinfect them. The simplest form in use even now is to dig a hole in the ground and let the refuse matters fall into it. It was formerly thought that as much of the refuse matters should soak into the soil as possible, and it was not thought necessary to remove them. It was even thought a good plan to dig down till a spring was struck, when the top might be closed up permanently, as there was never any cause to empty the pit. I need not dwell upon this method, as it is now universally condemned. The improvements upon this method have been of two kinds; first, the receptacle was made impervious to water, and second, it was made gradually smaller and smaller, so that less and less of these refuse matters could be kept about. These improvements have clearly brought the matter more within the scope of sanitary law, and brought things into a more healthy state. These receptacles were made water-tight, they were ventilated, and they were reduced in size, until they came to a mere pail or tub placed under the seat of the closet, and which can be removed once or twice a week.

The system of collecting refuse matters in large water-tight ventilated cesspools underneath houses is a matter which must not be disposed of in a word, because it is a system largely adopted in the present day, both here and in many large cities on the Continent. A variety of devices have been invented for emptying the contents of these water-tight cesspools. In former years they used to be emptied by hand, bucket, and spade, and the results were very disastrous. In Paris there are two forms of disease which go by names given to them from their being caused in this way. The men were subject (before these cesspools were ventilated) to a form of asphyxia called *le plomb des vidangeurs*, and also to inflammation of the eyes called *la mitte des vidangeurs*, and caused by the ammonia in the foul air. In order to do away with these disadvantages various contrivances have been invented, and the best thing known is the air-tight tub or carriage which is exhausted, and then connected by means of hose with the cesspool. A tap is turned on, and the contents of the cesspool rise through the hose into the cart. This is supposed to be done without any nuisance at all, but anyone who has walked about the streets of Paris and Lyons at night will know perfectly well whether there is any odour or not connected with the process. During the last few years a great variety of improvements have been made.

Professor Corfield then described an experiment which he had witnessed recently at Kew, with what is known as the *Système Tallard*. A large barrel or cart was exhausted of air by a stationary engine, connected with the cesspool by means of a tube jointed in a most ingenious manner, and the emptying was carried out without the smallest nuisance. It is clear that the cesspool system has not yet seen its last days, and so it is important to recognise any plan which reduces the nuisance of it. As to the system of collecting the refuse matters in pails or tubs underneath the seat of the closet, which has been adopted of late years in many of our large towns, such as Birmingham and Rochdale, it is the only system, with very few exceptions, that has ever been made to pay. If it is necessary to have a collection in towns at all, as appears to be the case at present in some of our large towns, I think, said the lecturer, that this collection should be made in small quantities, so that the excreta are removed as fast as possible. I think, he continued, that there can be no question that the towns at the present moment have chosen the pail system, and that they have done rightly; because, if these things are to be collected about the house, they had better be kept in such a condition that they cannot be kept in excessive quantity. They ensure a quick removal by this method, more so than by any other conservancy method. It is the only method which has ever been made to pay, and it has been made to pay in various parts of the world. It has been adopted in China for some thousands of years, and it is no doubt due to the utilisation of the crude sewage from this method, that China is at this moment not a barren waste, but conspicuous for its cultivation of the tea plant. It is the system that has been adopted for a great many years along the Riviera, for the cultivation of roses and orange trees; and has also been successfully adopted in various large towns in Germany.

In the modification of the method which is known as Liernur's Process, which is in use in Amsterdam and Leyden, the contents of the closets are carried by air pressure into underground receptacles and afterwards removed in air-tight carts; but it is not proposed, as a rule, to utilise it as it is, but to dry it, and convert it into a powder. This process of drying does not pay and never will pay. The manure does not pay the cost of being treated in this way. It will pay the cost of carriage to a short distance for utilisation as it is, but it does not pay for conversion. *Poudrette* is a dangerous substance to keep; this is a fact which is not generally known. An instance is recorded by Parent Duchatelet, of some *poudrette* being placed on board ship and becoming damp, when the majority of the people on board were attacked with fever and symptoms which leave little doubt that it was severe typhoid fever.

The mixed methods commence with the middens and ash-pits, which are being removed in almost every part of the country where they are found. These had been improved in the same way. The two great improvements in the midden system are making the receptacle water-tight and smaller, until what was formerly known as the Rochdale system consisted merely of a small space between the seat of the closet and the ground, a space made water-tight by being rendered with cement; the ashes of the house were thrown in and a hard mass was thus made, which was dug out from time to time. With regard to the midden system it is true with this as with the other conservancy systems; cartage is expensive, and so it is an advantage to the local authorities to keep the refuse matters about the premises as long as possible, especially if they are dried. We know how difficult it is in London to get

our dust removed, and we know what a nuisance our dust produces. There is no possible advantage in collecting the manure in this way; in the majority of cases the middens have to be drained, because the ashes are not sufficient to dry all that is in the middens. The liquid part is then allowed to go off; the liquid is worth 7s. 3d. and the solids only 1s. 3d., and if the midden or cesspool be drained the most valuable part is allowed to drain away, and the part left is not worth keeping. This, mixed with ashes and soil, has never been found worth the cost of carriage, any more than the refuse of the dust-bin is worth carrying. Testimony was given by Sir Joseph Heron that in no case was it found to pay; so far was it from paying as a manure, that at Manchester, and several other large towns, they have adopted a system of burning it, and that is about the best thing they can do with it. The Fryer Process is one which, I think, has a future before it, and is likely to be considerably adopted, and some of the London vestries have been considering whether it may not be adopted for the disposal of the contents of dust-bins.

Professor Corfield then passed on to consider the dry earth system, which is a very old way of treating excretal matters, and which was improved upon and reintroduced by the Rev. Henry Moule. After describing this well-known system, the lecturer said that experience has shown that there are considerable disadvantages connected with this system; so many disadvantages that no large towns have been found to adopt it as a permanent system. The disadvantages of this system are that a large amount of earth has to be sifted and carried to the required spot, and again the mixture has to be carried away, so there is a considerable amount of carriage. It is necessary that this compost should be kept dry, and that is a very difficult matter. Slops must not be thrown in; the supply of earth must not fail. It was found in some parts of India that this system would not work at all on account of the dampness of the air. Moreover, we do not know that the mixture with earth disinfects as well as deodorizes. The earth system, which was largely introduced into barracks in India, was described in early reports as being a great improvement on the previous systems. A short time after, however, the reports became very doubtful. When one looked back to see what the previous systems had been, one could not be surprised that the earth system was superior to the ones previously in vogue. In India they came to the conclusion, as in every civilised community, that for every 191 lbs. of refuse matter that had to be carried away there was only one pound that was removed by the earth closet, and the remaining 190 lbs. had to be removed by some other way, and therefore they came to the conclusion that it was impracticable. It can only be regarded as practicable for volunteer reviews, cattle shows, and other similar large temporary collections of people. It cannot be regarded as a satisfactory solution of the sewage question, except in small villages, where the closets are outside of the houses. I think it is quite conclusively shown that it is not suited for large institutions. As to the manurial value of the compost collected in the earth-closet: at first sight it would seem that all the manurial value of the excreta would be retained. This was apparently so clear, that in one of the Government Blue Books there was an elaborate calculation gone into, by means of which it was shown how large an income a town of 10,000 inhabitants would derive from the sale of the manure. This was made on the assumption that all the manurial constituents of the excretal matters were retained in the earth-compost. In the seventh report of the Sewage Committee of the British Association, it was shown clearly that the percentage of nitrogen in the soil used in earth-closets was increased only to a very slight extent by each use of the closet; and after the earth had been used six times in closets it was only fit to be used as a good garden mould, and would not bear the cost of carriage, except to a very short distance, so the whole question of the manurial value of the mould was solved in a very sudden manner.

With regard to conservancy systems, they are condemned by their name. The very fact that carriage is expensive makes the local authority remove the excretal matters as seldom as possible; and sooner or later all these systems become a nuisance, and they are only to be tolerated where no other system can be carried out. I am speaking now more especially of large towns. In small villages the dry earth system is often adopted with advantage when the earth can be readily got, and when the system is carried out under proper supervision.

Professor Corfield, in speaking of the water-carriage system, said, very little is to be gained by keeping any of the excretal matters out of the sewers. The sewage has to be treated all the same. The sewage of towns which adopt other systems than the water-closet system, has been observed to be fouler, because staler than in towns, where all the excretal matters are carried away by water almost as soon as they are formed. I will merely say, with regard to the construction of sewers, that we have all come to the conclusion that sewers should be made water-tight, as small as possible (they are often too large), that they may be properly flushed, and they should be thoroughly well ventilated. I would remark upon this point the mischief of mixing water, which ought to go into drains, with the sewage. Surface water, which ought to go straight into the rivers, is allowed to mix with the sewage, and so renders more difficult the treatment of sewage at the outfall.

One of the greatest improvements we have arrived at in the present day in this matter is the way in which we deal with house sanitation. The fact that we have come to recognise that the drains of the house should be thoroughly and entirely disconnected from the sewer, and have an air break between them and the sewer, so that no sewer air can get into the house drains, is one of the most important improvements which have been introduced.

We come now to the treatment of sewage. There must be sewage in all towns to be treated: what I say now will apply to all towns. The sewage I am speaking of now is the liquid that runs through the sewers. We come to the point of the value of it. It is valuable, of course, because it contains a quantity of excretal matter, vegetable refuse, etc. Its value consists chiefly in the salts of ammonia (amounting to five or six grains in a gallon) and the organic matter. Each 100 tons of average sewage are estimated to contain dissolved matters worth about 15s., and suspended matters worth about 2s., so you will see that the suspended matters are worth very much less than the dissolved. The total is about 17s. per 100 tons, or about 2d. a ton; but it is worth to a farmer not more than 1d. a ton at the outside. With regard to the disposal of this sewage, it is very frequently turned into the rivers, to the pollution of the water, and the production of nuisances in various

ways, not to mention the waste of the manure. It is also in many instances thrown into the sea, and when turning it into the sea does not cause a nuisance it may often be defended on the score of economy.

A variety of chemical substances have been used in the attempt to precipitate the valuable matters of sewage. When you consider that the most important manurial constituent is ammonia or salts of ammonia, you will see the utter futility of using precipitating substances. To any chemist it is a self-evident absurdity. I need hardly describe to you the various precipitate processes, but content myself with saying, that one and all have failed to precipitate four or five grains of ammonia from a gallon of sewage, and that the manures produced have been almost worthless. Some of these processes will be found to be of use, because they do precipitate the suspended matters from the sewage, and render the liquid more amenable to subsequent treatment; but the precipitates produced can never be valuable. Farmers have refused to take some of these precipitates when offered them for nothing, and in this have shown sound discrimination, rather than ignorance. One of these precipitate processes I propose mentioning, because it is a process which does not attempt utilising the precipitated matters as manure, and that is the process devised by Major Scott, in which the precipitate is burnt to form cement. On the subject of intermittent and downward filtration, Prof. Corfield said it was suggested first by Dr. Frankland, who showed that sewage, when it is passed downwards through soil, is purified, and if upwards, scarcely any purification takes place. It has been shown that large quantities of sewage can be purified on a small area.

On the question of wide irrigation, the first thing that should be stated, and which is not generally appreciated, is, that an irrigation farm should be an extended filter. The soils through which water will not go, are not capable of purifying sewage at all times of the year. It should be a soil which is pervious to water, through which the sewage can percolate into drains underneath. Purification, which is the first object to be attended to, goes on under all circumstances in pervious soils, so long as too much sewage is not put upon the soil.

In the winter the sewage is only partially purified upon impervious soils, so that one of the most important things in connection with it is that the soil should be pervious, and the sewage pass through it, and not merely over it. If sewage be taken and passed over a field which is impervious, it undergoes a certain amount of purification. If it be passed over a second field it may come off more impure than when put on it, and that was clearly shown in connection with some sewage at Redhill Farm. The Sewage Committee of the British Association had made a number of experiments to determine what proportion of the manurial value of the sewage was utilised upon a farm. The farm which was experimented upon was Breton's Farm, Romford. Samples were taken daily for several years, and subjected to analysis. The results were found to be that during five years the percentage of nitrogen recovered from the manurial constituents had been from 26 to 42 per cent., and averaged nearly 33 per cent., that is to say, one-third of the nitrogen which came from the town was recovered in the crops; about the same proportion as is recovered from the best artificial manures.

A word or two about the supposed dangers of sewage farms. The dangers are a myth; there is not the smallest evidence to prove that these dangers exist. There is no evidence that diseases like cholera, enteric fever, or entozöic diseases, have been spread by these means. One of the great difficulties in connection with sewage farms is, that the sewage has to be utilised and put on the farms at all times of the year, whether it is wanted or not. That is one of the great bugbears. That must be got over by laying out a certain area for the purpose of filtration at all times, whether the sewage is wanted on the land or not. In Birmingham, the committee appointed by the Town Council to report on the various sewage processes, came to the conclusion that it was impracticable to get sufficient area of land to adopt wide irrigation, and recommended the adoption of the plan of making a large filter. Different towns may adopt one or other of the two systems—either have irrigation supplemented by a filter, or have a large filter to purify the sewage without reference to irrigation. The staple crop on irrigation farms is Italian rye grass, which absorbs an enormous quantity of sewage. Professor Corfield said he held in his hand reports which showed that wheat, barley, oats, turnips, mangolds, cauliflowers, strawberries, peas, etc., had been grown successfully on these farms.

In very few instances have sewage farms been made to pay. They have been made to pay at Edinburgh, and at one or two places where the situations have been favourable. In many places pumping is required, but pumping is not so costly as people make out. It is a very slight expense to a town when the sewage has not to be lifted to any great height. The farmers will come to see that it is to their advantage to take the sewage and put it upon their farms, and I have no doubt we shall see a great many more places, in which, if money is not actually made by the sewage being utilised, at any rate very little expense will be incurred by the towns. This, I believe, is the best solution of the difficulty for the largest number of places. I do not mean to say it is suitable for each and every place. In towns where it is found to be practicable, I think the inhabitants must submit to be taxed to a small extent for the removal of a serious nuisance, and the lowering of the death-rate.

In the discussion which followed, Mr. SILLAR said that Professor Corfield had been very brief in entirely setting aside all precipitate processes, which he regarded as the great rivals of the irrigation system. Simply mechanical filtration he regarded as totally inapplicable for the treatment of sewage. He agreed with Professor Corfield that sewage going over the land underwent purification. He thought it only right to suppose that if this were so, by putting the earth upon the sewage the same action would take place, and he regarded it to be more economical to put the earth upon the sewage, than to put the sewage upon the earth. The precipitation process he thought did preserve the manurial properties of the sewage in a very high degree. He thought the depopulation of ancient cities was not more due to pestilence than to famine. With regard to the utilisation of sewage, he said it was one thing to utilise the sewage for the fertilisation of the ground, and another to fertilise the ground for the utilisation of the sewage. It was utterly impossible that a few acres of ground could be made available for a large amount of sewage. The best proof of the value of the precipitate process, as practised at Aylesbury, he took to be that 4,000 or 5,000 tons of it have been annually sold, for many years, without any diminution in price.

Mr. BAILEY DENTON, jun., said that Professor Corfield had referred to Dr. Frankland as having invented the intermittent downward filtration, but had not referred to the numerous cases throughout the country (a dozen or more) where it had been practically and profitably carried out. He did not show that by means of intermittent downward filtration, in combination with irrigation, that a sewage farm could be made to pay.

Mr. DOUGLAS ONSLOW said there were many places in the country where it was impossible to deal with the sewage by irrigation, because it was impossible to get land for the purpose, and if land were obtained it might not be of the quality required to enable the sewage to filter sufficiently well. Then, again, there was the question of cost: how much would it cost to pump the sewage on to the land. Taking the sewage into the sea he regarded as disgraceful waste. At Coventry the sewage was removed at a cost of one shilling per head of the population, or £2,200 a year, with a population of 45,000. He was of opinion that if sewage was to be removed it must be removed roughly; directly it was taken away cleanly expense was incurred. In allusion to a remark made by Mr. Sillar, he did not think they had any right to complain of waste, unless it could be shown that the thing wasted was worth having, or the thing made portable worth carrying.

Mr. JENMANN had found that farmers who had dropped taking the sewage, came back after finding the want of it. He was of opinion that the land was the proper place for it, and that it should be got on to the land as soon as possible, and thought there were always large waste tracts of land available for the purpose.

Mr. THOMAS WILSON GRINDLE was engaged in erecting machinery for the A.B.C. Company, where they succeeded in getting a very good effluent. He was now engaged in carrying out another process at Edmonton, known as Hillé's system, and he got a good effluent there. He suggested an amalgamation of the different companies, and so to put an end to the continual ill-feeling between the advocates of the different precipitation processes, and he suggested a meeting for this purpose.

Mr. R. W. P. BIRCH did not think that any line could be drawn between irrigation and intermittent filtration.

The CHAIRMAN said the same arguments which had been used by Mr. Grindle were put forward at the Leamington Congress, sixteen years ago, and the result was the passing of a resolution which was agreed to unanimously by the meeting, that irrigation was the plan to prevent the pollution of the rivers of this country. At that meeting he argued very much in the same way as Professor Corfield had done, and he did so from great experience derived in the working of the Croydon Sewage Farm, situated in the midst of a rather dense population. They had succeeded in producing immense crops of rye, grass, and vegetables. One of the great reasons that has led to the difficulties connected with sewage farms, was the promulgation of a myth (due, in a great measure, to precipitators) that these farms were terribly injurious to public health, in which there was not a tittle of truth. He was not going to attempt to show that the precipitation processes might not be necessary in some cases, because it might be impossible to obtain land for the purpose of irrigation, but he believed that there was no large town in the kingdom where it was not possible to combine the intermittent downward filtration with wide irrigation, wide irrigation, after all, being only intermittent downward filtration. His opinion was that if you have growing crops on the land it was better it should not go so deep into the land. Where you have clayey lands, as they had on one of their farms, they got most excellent filters in the summer-time, but not in the winter. He thought Professor Corfield's address gave them a very large amount of important material, a great amount to think about and dwell upon and to use on future occasions; and the battle which was going on between the supporters of precipitation, against the supporters of irrigation, would probably one day be settled, but when that would be he could not say. There could be no chance of any agreement being come to, so long as the management of sewage farms remained, as it did at present, in the hands of local authorities. There was so much difficulty, with the changeable character of the managing committee, to get farmers who would go in and farm one of these farms, and pay the rent for it. They will have to pay a certain amount to enable the farmer to carry on his farm in a proper manner. Then would be the time when farms would be improved by irrigation, and would be found to grow four times the amount of crops of land not so treated. The population is increasing so greatly that how to feed the population was a question the statesman would have to meet, and the day might come when famine would come upon them in spite of sewage farms.

Dr. CORFIELD thanked the meeting for the kind way in which they had received his remarks. His intention had been to put before them, in as short a time as possible, the main results which had been arrived at at the present time; which they might, at the present moment, consider their standpoint, and go forwards. With regard to the precipitation processes, it was of no use to tell a chemist that any plan of fortifying sewage could pay. Doubtless sand could be made to pay for carriage and treatment if gold dust were sprinkled over it; but no one would assert that the enrichment with gold dust, to be subsequently extracted, was a remunerative or wise enterprise. The simile held good with all additions to sewage; the stuff itself was worth on a favourable computation, about twopence per ton, and the cheapest chemicals that could be added to it would not make the compound worth carriage plus their original cost, to the farmer.

THE MEDICAL OFFICER OF HEALTH AND HIS WORK.

An address delivered at the Annual Meeting of the North-Western Association of Medical Officers of Health, June 16, 1881.

BY G. A. KENYON, M.B.,
Medical Officer of Health for the Chester Combined Sanitary District; President of the Association.

ALTHOUGH of modern medicine our branch of the profession is the latest development, in ancient times officers of a corresponding class were important state functionaries, and on the continent Officers of Health have existed in modern times much longer than in this country. Whilst if we look to America and our Colonies, we shall find our colleagues are perhaps more appreciated than we ourselves in this country. Whatever others may think of us, it behoves ourselves to take a high view of our relations to the commonwealth and to science.

Compared with the wide range of subjects and the intensely personal interests of general practice, our special sphere of operations may at times appear

limited and unattractive. But, on the other hand, we may consider ourselves as working after the example of the immortal Jenner; our efforts aim at benefiting the million; though it may be a small thing that we do or say; for that matter, looking at Jenner, what operation can possibly be smaller than the vaccine puncture? Yet multiplied, the result is a gain to thousands of persons, their lives and happiness. We are each of us placed, as it were, at the helm of a community, large or small. By a word, or it may be by a good deal of suasion, enforced by professional and scientific knowledge, we have the means and, to the best of our ability, we exercise it, of so guiding the civic or domestic forces—the engineer, the lawyer, the builder, the plumber, the drain-layer—that a change from death-dealing to life-permitting is impressed on the construction of houses and streets, on sewerage and water-supply. We leave our mark for weal or woe in ways that the public have little opportunity of perceiving, and seldom acknowledge.

Yet while our influence is widespread in its extent, it is not to be exerted without a close attention and mastery of detail. Generally speaking, we do far more good by teaching and showing others what to do and how to do it, than by direct action of our own. Yet it is often only by doing the thing ourselves we can teach how it should be done—we incite by example. In our conflict with disease, it is only by our being ever at the elbow of the Local Authority that the way can be gradually paved for the extirpation of conditions which promote typhoid and other malignant fevers. But as to scarlet fever and its congeners, what a splendid prospect the recent discoveries in microscopical pathology have opened out to us.

Every promise is given, not only of understanding something of the how and the why vaccination is and does, what it is and does, but we have a prospect, clear and distinct, of the possibility of applying a like method to the extirpation of the very diseases, such as scarlet fever and measles, which at present most successfully defy our efforts to withstand them. Some of our branch are already devoting their attention to a repetition of the experiments to which I allude. We must all hope it will be only to verify the results which have been published. Far be it from me to suggest a doubt, yet it may prove that the success has been too great, that new causes of morbid conditions and new pathological objects have been discovered, imitating, but not identical with, the disease they simulate.

So far, I have dwelt upon the more agreeable aspect of our position, but in the course of our work at every turn we have to encounter prejudices and to encroach upon the rights of property or trade or personal freedom, so much so as often to cause us to be considered by those whom we seek to benefit as ourselves a nuisance greater and more disagreeable than the evils we contend against; so badly are we treated at times as to breed a despair and misgiving, that after all may not the public be right? Is it worth while—nay, is it wise—nay, has not the advance of our civilization done wrong in being so solicitous for the preservation of human life? Has not the result been to substitute death by starvation for quieter and easier modes of exit? Look everywhere. Look at India, the result of stopping wars and mitigating plagues—its famines—Ireland, Italy. What will it all come to? A visionary hygeia full of nothing but teetotal dyspeptics and discomfort!

As the health of the people is intimately connected with the wealth of the people, I wish to direct your attention to the question, Is it impossible to conceive a National emigration scheme, carefully organised, whereby our energetic and industrious surplus population may have a chance of contending with the forces of nature, for the bread which perisheth indeed, but which is necessary even for those whom science has taught to bend the lightning to their service, and whom religion has made equal to any sacrifice?

What is wanting for this, and the want of which is, perhaps, likely to prove a more serious obstacle than apathy on the part of the public, is not so much the difficulty of finding a head to devise a practicable scheme, but the difficulty of getting the right men appointed to carry it out—a staff with the necessary energy and enthusiasm. Indeed, in ordinary affairs everywhere around us, we see how much is lost from this difficulty—to prevent jobbery, or apart from that, to secure a right selection. But we *must* face the situation—all our civilization is in vain unless we look much further. An organisation such as the world has not yet seen, and only communists have dreamed of, is at once possible, and the only hope for life and progress.

In some degree the principle that the state should make provision for the unemployed was recognised in the time of Elizabeth, when anyone a second time convicted of having no means of existence, was sent straight off to the gallows, and in the language of a contemporary writer, the victims were to be seen hanging by scores. This was certainly a very crude remedy, yet it was direct, permanent, and complete in its efficacy! No real progress has been made since; society, in truth, is still savage and barbarous at heart; hence the indifference, actual or comparative, with which those who have abundance see their brother suffer need.

When we consider the stupendous progress which has been made in science, engineering, and mechanics, it is perfectly amazing that in regard to the essentials of existence, the methods of political and social economy are so utterly, so fearfully, backward.

This is not the time or the place to pursue this matter further. After what I have said of our aims and objects, it is only right that I should remind you that we can, indeed, have little success where we are not supported efficiently by the Inspector of Nuisances. In many of our aspects the inspector is the hand of the Medical Officer of Health, and a hand that requires a very considerable amount of nerve. Much of the efficiency, and very much, if not all, the comfort a Medical Officer of Health may have left to his existence, will depend on the tact, discretion, and energy of that officer. Those only who know what it is to have one of the right sort can appreciate the power which can be exercised in this way. The incoherent manner in which our sanitary organisation is planned, and which, perhaps, alone is adapted to the genius of such a free people as our own, leaves everything to depend on individual energy and influence. We have, indeed, the power to invoke legal penalties; but rashly used—used in any but the most cautious way—these are not merely useless but disastrous.

It has been suggested that inspectors should be trained, and certainly some practical knowledge of draining and plumbing is invaluable, and it may be possible ere long to devise a complete system of education for the post, but I should fear to start it, lest, with increase of knowledge, we should lose something of that mother-wit and knowledge of men, that now makes the good inspector so very efficient when we do get him. Whilst referring to the loose condition of our sanitary organisation, I may, perhaps, take the

opportunity of observing that it is difficult to see why Medical Officers of combined districts, restricted from practice, should be left in such a very uncertain position as to fixity of tenure. The position of these officers is peculiar. Being restricted from practice, they have not that freedom and security which other Medical Officers derive from having a private practice to fall back upon. And whatever may be said as to the necessity of avoiding the error of getting unsuitable men fixed in a position from which they cannot be dislodged, and in which they are useless, this argument cannot be justly employed after an officer has held his post for a number of years. I would suggest that to one who has been thus tried successfully, might be granted, for a certainty, the moiety of the salary which he derives from the Local Government Board, and I feel sure that a step in this direction would be recognised as reasonable by the Local Authorities everywhere, and such a man, with his experience and training, could be made useful in many ways, even if the particular locality in which he has served a lengthened period, say seven years, wished for a change.

The Inspector of Nuisances may have his action hampered by uncertainty of tenure, but this does not often lead to any pecuniary loss where his services are wholly retained by the Sanitary Authority. For a man of his class it is easy to find another sphere of remunerative exertion, whereas the Medical Officer would find himself not merely without a *clientèle*, but he would feel so rusty, and to have lost such opportunity of experience, as would altogether unfit him for resuming practice; indeed, he would be a positive danger to the public, and from that point of view, if from no other, he should be saved the alternative.

I would take this opportunity of directing your attention to a matter which I feel sure you will agree with me is of great practical importance. A special object in appointing one medical man to fill the office of Medical Officer of Health, is in order that an opportunity may be afforded of accumulating experience and information. For enlarging information and bringing forward experience of a special sort, the Local Government Board issue an annual volume, embodying the results of the work of their staff of Medical Inspectors and experimentalists, under the able superintendence of their Medical Officer. This volume, although calculated to be of the greatest possible service to Medical Officers of Health, is not in any official way supplied to them, or even brought to their notice. The number printed is small, and it often happens when the volume is of the greatest value it is out of print before the Medical Officer of Health finds the need of it. Under any circumstances, there is a certain amount of trouble and expense, which the numerous Medical Officers of small districts, to whom the reports would be of the more value as their own opportunities of experience are the less, will hesitate to incur—a trouble and expense which none of us have any need to incur. It may be said that the Local Authorities might order copies to be sent regularly, but who that knows anything of them can say how long it will take ere this duty become generally recognised. Surely it would be within the scope of the Central Board to have a copy distributed to each Medical Officer of Health.

I would respectfully suggest that this association take an early opportunity of directing the attention of other associations to this matter, and to arrange for petitions and deputations to attend the President of the Local Government Board on the subject.

There is another practical point to which I would direct your attention, with a view to organising a combined movement of other Societies of Medical Officers of Health. I venture to think you will agree with me that the time has now come for calling the attention of our legislators to one or two of the more pressing defects in the Public Health Act, such as the absence of any clear provision such as would give us indisputable power to require the ventilation of soil-pipes and drains, and disconnection of sink-pipes and baths. We have a power in this direction, and it is exercised in many places, but not being quite unquestionable it has to be exercised with great discretion, and at considerable disadvantage. There is surely no reason why this should be allowed to continue. A single clause in the next Sanitary Act might be framed to give us all the power we require. Another defect in the Act has only to be pointed out to admit of instant recognition. I refer to the section in the Public Act which gives power for the Sanitary Authority to compel connection with a sewer within the limit of 100 feet; this limit should be largely extended. No real hardship would be thus inflicted, sewering and drain-laying being now a far simpler and less expensive thing than when this clause was originated. In regard to this clause and the one relating to closet accommodation, the penalty on non-compliance with the order of the Sanitary Authority is, that the Sanitary Authority may do the work, and recover the expense from the defaulting party, before a court of summary jurisdiction. Now I think there is no sufficient reason why the ordinary penalty should not be optional on the part of the Sanitary Authority to demand. Sanitary Authorities are naturally reluctant to embark on litigation of the kind that would be necessitated in the case in question. The result is, that too often the offence is allowed to continue unattacked.

I have the less hesitation in making these suggestions for the improvement in the sanitary law on this occasion and in this detached and anomalous connection, because the evils to which they refer are crying, and of everyday occurrence, and there is no prospect of improving the Public Health Acts, except in a detached fragmentary way, as the necessity and opportunity arise. In bringing to a conclusion what I fear you will consider a somewhat rambling composition, I have to thank you for your kind attention, and to express a hope that as a society our meetings may be well attended, and that every member will contribute something to our stock of experience and edification. It is difficult to overrate the advantages which may be derived from a regular attendance, not only at the general meetings of the association, but at less formal discussions which succeed them, when individual members can confer over points of individually more pressing interest.

THE SCIENCE AND ART OF SANITARY PLUMBING.

ABSTRACT OF LECTURES DELIVERED FOR
THE NATIONAL HEALTH SOCIETY,
BY S. STEVENS HELLYER, ESQ.,
At the Society of Arts.

III.—TRAPS AND TRAP VENTILATION.*

MR. STEVENS HELLYER'S third lecture of the course of six lectures to working plumbers, under the auspices of the National Health Society was on traps

* For reports of previous lectures see THE SANITARY RECORD for June 15, 1881.

and trap ventilation. The lecturer, in his introductory remarks, observed that owners of mansions and parks were often more generous to their enemies than to their friends, for they warned poachers by writing up 'Beware of man traps!' although they never warned their guests by writing up 'Beware of foul traps, which breathe out noxious gases!' There might be only a man-trap here and there where poachers might come, although there might be dozens of foul traps in and about the house where the guests were likely to be found daily. Moreover, man-traps did not kill: they only caught a would-be thief, and bruised his leg a little; but foul traps not only caught a friend, at times they gave him illnesses, perhaps typhoid fever, and even death. It was, to the lecturer's mind, a most iniquitous thing that when soil-pipes, waste-pipes, and drains needed to be trapped off (as they always did), such filth-collecting boxes as D-traps, bell-traps, cesspool-traps, and manhole-chain-syphons, should be used. Some people were now condemning the use of traps altogether. It was true that such anti-trap men were few and far between, but the fact that men were to be found preaching against the use of traps, and practising what they preached (for in their works they did not fix traps to sinks, lavatories, or water-closets), called for some notice. He was most strongly of opinion that the advocates of such open (untrapped) pipes were utterly wrong in their teachings. When waste-pipes were fixed without traps, what was to prevent them acting as ventilating-pipes to the house? especially when one end of the pipe was in a warmer and more rarified air than the other, which would generally be the case, one end being connected with the sink, lavatory, or water-closet *inside* the house, and the other end being open to the colder and heavier air outside. The fact was that directly such pipes completed their legitimate work—that of conveying waste discharges—they became ventilators, and helped to feed the fires and house with air of questionable freshness or purity. Of course if such waste-pipes could be kept perfectly sweet (a thing practically impossible), no danger could arrise from such an arrangement, and it would save the trouble of opening the windows. A waste-pipe from a sink or lavatory, and still more from a urinal, could not help getting foul. Take the case of a scullery-sink, the general sink in small and moderate-sized houses. The servant threw down into this sink a body of green-water hot from the saucepan, and, before the waste-pipe was dry, she turned a tub of hot greasy dish-water into the sink, with the washings-out of the dripping-pan. Then she washed her hands in a bowl, using plenty of soap, of necessity, to get her hands clean, and the bowl of soapy water was emptied into the waste-pipe, the suds adhering all the way down the pipe to the greasy matter already deposited upon it, and bubbling off in bad air to come back again into the house. Would any of the anti-trap men drink a glass of water after it had passed through such a waste-pipe? Assuredly not. Yet they did not mind the occupants of the scullery (or wherever such sinks were fixed) breathing the air which came through such filthy pipes. No lavatory or sink should be fixed (whether the waste-pipes from them are trapped or not) which would not allow a body of water to be sent through them to more than fill the bore of the waste-pipe, for all sorts of matter was at times emptied into such fittings, and unless good and efficient water flushes could be sent through them to cleanse it away, such matter adhered to the interior of the waste-piping and decomposed there. In a gentleman's house, only recently built, and with its sanitary arrangements carried out under the rules laid down by the Local Board of Health for the Croydon district, the lecturer said he had a test made to see the quantity of air which passed in an ordinary way through an untrapped waste-pipe. An anemometer was fixed on the grating over the top of a 2 in. untrapped waste-pipe of the scullery sink, and between the hours of nine p.m. and seven a.m. on the following morning (in the first week of the April of this year), the anemometer registered 8,205 lineal feet of air as having come into the scullery through the sink-waste, or an average of 820 feet (lineal) per hour. Of course, the air which passed in through the waste-pipe did not remain in the scullery, but passed to other parts of the house, to be breathed by its occupants. Passing on to speak of water-closets without traps, the lecturer said nobody attempted to fix a water-closet without having some sort of seal between it and the soil-pipe; and though anti-trap men dispensed with the water-seal (or trap), they did not fix water-closets without some mechanical means of shutting off the soil-pipe from the closet, *i.e.*, somewhere in the closet, or on the basin-outlet, they contrived to fix an india-rubber or metal valve, plug, or stopper, to prevent soil-pipe air coming into the house through the closet. There were now several methods of fixing such untrapped water-closets and soil-pipes, and if he were asked to say which of those methods he considered the most sanitary, he should say that known as Mr. Norman Shaw's. Mr. Norman Shaw made his soil-pipe only 3 in. in diameter, and therein he was quite right, as a 3-in. pipe could be kept more wholesome than one of a larger size. But, if filth could and did accumulate upon the interior of sink and lavatory wastes, if wastes used for the conveyance of mere dirty water got foul, how much more foul must pipes which took away excremental discharges get? He was willing to admit that if large and efficient water-flushes were sent through the soil-pipes after each usage of the closet, such an arrangement as that of Mr. Norman Shaw might be kept tolerably wholesome; but if the closet were used with inefficient water-flushes, as would often be the case, the soil-piping must in time become very offensive. The handle of a water-closet apparatus was often pulled only just sufficiently to discharge the contents of the basin into the soil-pipe, leaving the deposit which escaped out of the closet-basin, with whatever water there was in it, to stain its way down the interior of the soil-pipe to the drain; and then, as the basin-valve would be closed, there would be no flush of water to follow it to cleanse the filth away, but the excrement would be left to corrode upon the pipe. Again, however learned a person might be in the art of pulling up a closet handle so as to give a free passage to the out-going matter and to well open the flushing valve, there would at times be no water in the supply-pipe to come into the closet to cleanse it. The water-supply sometimes failed (1) because some leaky valve had leaked all the water out of the store cistern; (2) because repairs were being made to the company's main, and the water did not come in; (3) because the supply-valve or water-waste preventer was out of repair; or (4) because the water in the pipe was frozen. If the latter was the cause of there being no water, the fault was peculiarly that of the plumber, who ought not to have fixed his service-pipe where it could freeze. Another source of fouling a soil-pipe was that of using a water-closet as an urinal, in which case the standing water, largely impregnated with urine, over-

flowed down the overflow-pipe into the soil-pipe, and corroded upon it, for it was only rarely, in such cases, that the handle of the closet was pulled. He had known many soil-pipes to ladies' water-closets, *e.g.*, at railway stations, to get so furred that the bore had been reduced to one-half its original size after a few years' usage. Whatever mechanical means were used in untrapped water-closets for excluding soil-pipe air from the house, they were sure, at times, to fail. In the case of water-closets with metal seatings, india-rubber valves, or plugs, there were several ways whereby a failure might arise. For instance, the mechanism itself might fail, or a piece of paper or other matter might get between the valve and its seating causing the water to escape out of the closet basin, and so leave an easy passage for the admission of soil-pipe air to the house. There were other evils attending such a system as that of Mr. Norman Shaw, such as (1) the danger of frost at exposed points; (2) the difficulty of limiting the length of the soil-pipe, for circumstances would require it to be of various lengths, and careless people would put no limit to it. Architects did not gain their reputations by designing the elevations of their buildings to suit water-closets. In some buildings the last thing to be considered was the water-closet, and so it got stuck anywhere where there was room for it, without reference to the drainage from it. The vitiated air in a long length of soil-pipe arm necessary to avoid a porch, oriel window, or other projection, would often escape into the house through an open basin-valve or imperfect seating. Having condemned what was, in his judgment, the more sanitary method of the two or more systems of fixing untrapped closets, the lecturer called attention to what he regarded as a more dangerous method still. It was within his knowledge that the plumbing and so-called sanitary arrangements of a nobleman's mansion had been carried out on principles which he was about to explain, and that, too, within the last twelve months. He did not know who was responsible for introducing stacks of soil-pipes with trapless water-closets upon them, but he believed it was the outcome of two or three would-be sanitarians. A tier of trapless water-closets was fixed on one stack of soil-pipe, and that stack of pipe, having one, two, three, or four water-closets upon it, might, or might not, be trapped at the bottom. By some men it was trapped and ventilated at top and bottom, but by others it was not trapped at all. In the nobleman's house referred to, the soil-pipes were not trapped off or disconnected from the drain, though the drain was open to the atmosphere somewhere in the grounds. By that system a drain was brought into the house, and branches from it were carried up under the floors to receive the various stacks of soil and rain-water pipes. The drain was carried some distance away from the house before it was exposed to the atmosphere, and the several stacks of soil-pipe were continued up through the roof full-size for ventilation, with cowls upon them. With such an arrangement there would often be no ventilation at all in one or more of the stacks of soil-pipe. It would, therefore, be quite possible for one or more stacks of soil-pipe to become filled with bad air, and in case of a defective basin-valve or an absence of water supply, a stack of such soil-pipe, with a tier of trapless water-closets upon it, might ventilate itself, and the drain too, into the house. Having shown the necessity of trapping, the lecturer proceeded to discuss the best means of doing it. He observed that all that was wanted in ventilated waste-pipes and drains was a water-lock. No sanitary fitting, waste-pipe, soil-pipe, or drain should be trapped in a way that would not admit of the whole of the water in such traps being entirely changed every time a flush of water was sent into them. Traps should only be required to act as air-barriers, to ward off the air travelling through the pipes, and to prevent it from entering the house. But traps used for that purpose were often so badly constructed, and the principles on which they were made were so radically wrong, that they both collected and held their filth, and became little cesspools. Such a trap was the D-trap. It was only fair, however, that he should say that one reason why some plumbers preferred the D-trap to the syphon was, that it was not easily syphoned out like the latter. About the first form of trap used, the lecturer believed, for fixing under water-closets, was the siphon or round-pipe trap,—*i.e.*, a pipe bent and re-curved in the shape of the letter ω; but as that trap in usage was easily siphoned, and plumbers had not learned the way of preventing siphonage by ventilating it, the D-trap was invented. He was able to say that the lead siphon trap was used under a water-closet as far back as 1775,—more than a century ago; but, as far as he could make out, the D-trap was not in use until 1790. Having shown specimens of foul D-traps, and illustrated, by experiment, the difficulty, if not impossibility, of properly flushing out such traps, the lecturer went on to speak of the bell-trap, which, he said, could vie with the D-trap in the amount of evil it had achieved. Indeed, it would perhaps be impossible, in connection with drainage matters, to find two more fruitful sources of evil than the bell-trap and the D-trap. The bell-trap was a non-cleansing trap, and was very inefficient on account of the movable top (which when removed left no trap at all), and of the slightness of the dip or seal. Of other non-cleansing traps, as well as of those which were self-cleansing, he would speak in his next lecture.

A gentleman in the meeting, who described himself as having been a plumber for very many years, asked whether discussion was allowed. On receiving a reply from the chairman in the negative, he said he thought it was very unfair that all that Mr. Hellyer said should go forth to the world as 'gospel'. He differed very materially from a great deal that had been said by Mr. Hellyer. The prohibition of discussion was not giving the trade a fair chance.

Professor CORFIELD, the Chairman of the meeting, observed that possibly the National Health Society would afford opportunity to the gentleman to give a lecture or lectures in reply to Mr. Hellyer's lectures. At any rate, objectors to Mr. Hellyer's views might urge their objections through the medium of the press. He (the Chairman), for his own part, agreed with almost every word Mr. Hellyer had said, particularly as to the necessity of having traps, although not such badly-constructed ones as D-traps and bell-traps, which could not be too strongly condemned.

IV.—TRAPS AND TRAP VENTILATION.

The fourth of Mr. Hellyer's lectures was illustrated by a large number of diagrams, and by practical experiments with traps of different forms made of glass so as to show whether they were or were not self-cleansing, and whether or not, under given conditions, they could be syphoned out. The lecturer said that on that evening he ought, according to the programme laid down, to be entering on the discussion of the subject of 'Soil-pipes and waste-pipes', but he had been unable, in his last lecture, to exhaust

the subject of traps. He had already considered the D-traps and bell-traps,—the two characteristic non-cleansing traps. There were many other traps, which befouled themselves, in use, but he only wished to speak of traps of that class which were used outside buildings, *i.e.*, in connection with drains,—before passing on to consider self-cleansing traps. Some might think that such traps were outside of his subject, but in his opinion the plumber's knowledge ought to cover the whole area of house drainage, and ought certainly to extend to the sewer, or the cesspool.

The first of the stoneware traps to which he would invite attention was the Mansergh trap, which, although only introduced within the last few years, had had an extensive sale, and was much liked by many. Nevertheless, he, the lecturer, condemned it—firstly, he said, because it was non-cleansing; and secondly, because it did not leave the end of the waste-pipe discharging into it open to the atmosphere. It was not only non-cleansing, but dirt-holding; for in use it must form itself into a 'collecting-box', as there were in it no fewer than eight corners in which filth could accumulate. No amount of water sent through such a trap could be made to scour the parts fouled. The bottom was flat, the sides were vertical; the partition dividing the two compartments was upright, and the area of the surface-water of the trap was several times greater than the inlet or outlet, so that the standing water of the trap, with its decomposing matter, could not get changed by any single flush, nor even by many flushes, sent through its inlet. The bad air from this body of contaminated water, if it did not escape through a waste-pipe into the house, would at times get in at the window, or door when near it. The arrangement of the inlet was bad, as it water-locked the discharging end of the waste-pipe, instead of allowing it to be exposed to the atmosphere. There was another evil in connection with that trap, viz., that the waste-pipe being trapped at its outlet end—*i.e.*, the remotest end of the pipe from the sink or fitting—would expose the house to any bad air or decomposing matter left in the pipe. In a trap which he (the lecturer) designed some years ago for receiving waste-pipes, and intercepting them from the drain, there were three dips or air-barriers, to prevent drain-air reaching the ends of any waste-pipes discharging into the waste-receiving compartment. Like the Mansergh trap, it had two separate bodies of water. It was specially constructed for receiving waste-pipes from baths and lavatories, when the latter were fixed on bedroom floors, and for protecting them from the drains, which it most effectually did. The trap had two important advantages over the Mansergh trap. First, it left the end of the waste-pipe discharging into it open to the atmosphere. Secondly, the bottom of the trap was rounded, and its configuration made it easier to cleanse. But that trap was not self-cleansing, or, at any rate, not so much so as he should like it to be, for an ordinary flush, or flushes, sent through it would not cleanse it. Now, when a trap could not be thoroughly cleansed, and the whole of the water standing in it changed, by a good flush of water sent into it through its waste-pipe, it ought never to be used, and so, though he held the patent for the trap of which he had last spoken, he condemned it. The well-known gully-trap was now being used for receiving waste-pipes from sinks, etc., but he did not wish plumbers to be 'gulled' into its use for such purposes. It might be a good trap for catching *detritus*, and, therefore, just the trap to use in yards and streets for surface drainage; but, as traps for receiving the discharges from waste-pipes were not wanted for catching (in the sense of holding) anything in the shape of decomposing mat er, the gully-trap was not the right kind of trap for sink, urinal, or lavatory wastes. It formed a catchpit for filth and decomposing matter, and no ordinary flushes of water sent into such a trap would cleanse it.

There were other traps of a non-cleansing character for disconnecting waste-pipes from drains, but which he had no time to stop to examine, as he must hasten on to consider the much-used drain syphon for trapping off sewers. That trap, being a round-pipe trap, would be self-cleansing if it had no 'man-hole', and if it were provided with means for a water-fall into it. Never, or very rarely, was any pressure of water brought to bear upon the standing water of the trap, and, consequently, the latter never got properly changed by a flush of water; while the man-hole or 'inspection' hole was a collecting-place for filth. Another evil in connection with this trap was its want of ventilation, *i.e.*, it had no provision, on its inlet side, for ventilating itself or the drain with which it might be connected. He had dwelt upon the non-cleansing class of traps and severely criticised them, because he considered that bad trapping meant bad drainage—certainly, good trapping was absolutely necessary to good drainage. If perfection in the sanitary arrangements of a house were desired, attention must be paid to every detail, for, however well planned the plumbing and drainage might be, it would not be sanitarily perfect with non-cleansing traps under the fittings inside the house, or with filth-collecting traps on the drains outside—*i.e.*, round about--the house. When foul matter was discharged into a trap, it should pass through it, as dreams through the brain, leaving no substance behind. Certain traps, which he called self-cleansing traps, would do this. The principles on which such traps were constructed, and the conditions under which they should be fixed, were—1. The trap should be free from all angles, corners, and places where filth could accumulate. 2. A free-way should be made for the discharges to pass through the trap without breaking their form—*i.e.*, the traps should be like a round pipe, so made or bent as to form a water seal, thus ∪. 3. The body-part of the trap, for fixing in horizontal pipes or drains, should be smaller than its inlet, so as to hold as small a quantity of water as possible, consistent with the position in which it was to be placed, and with the work which it would have to do, and so as to admit of the water being changed every time a flush was sent through it. 4. The minimum-sized trap should be used, consistent with circumstances, but governed to some extent by the size of the waste-pipe or drain on which it was fixed and by the flush of water likely to be sent into it. 5. The water-way into a trap should be larger than its body-part, or than the waste-pipe with which its outlet might be connected, so as to be able to allow of sufficient water flushes being sent through the trap to cleanse it and to cleanse its waste-pipe. 6. The inlet or mouth of the trap should always be so arranged, that the water flushes should fall upon the standing water of the trap with a vertical pressure, so as to drive everything foreign out of the trap, and to entirely change its previous contents. 7. The *inlet* side of all traps fixed upon drains outside the house should be open to the atmosphere, so that any bad air rising from foul matter decomposing in the trap, or coming through it from the drain or sewer, might readily pass into the open air,

or be largely diluted with fresh air before passing into any waste-pipe, soil-pipe, or drain discharging into such traps. In cold countries, where the water standing in the trap would be liable to freeze in severe frosts, the mouth of the trap should be sealed over, and the foot-ventilation or air-induct should be be taken into the waste-pipe, soil-pipe, or drain, some little distance away from the standing water of the trap (to prevent the cold air currents playing upon it and freezing it). In this country, in sheltered places, there was little risk, and if the trap (for disconnecting waste-pipes, soil-pipes, or drains) was kept well down into the ground in exposed places, there was no danger from frosts, though in severe frosts it was as well to throw a little straw over the gratings of such traps. He had only heard of one such drain-disconnecting trap being frozen during the last severe winter, out of hundreds that he had had fixed, scores of them, from circumstances, having their standing water within 15 inches of the ground level.

Having shown by ocular demonstration that round-pipe traps are self-cleansing, the lecturer showed that such traps were syphoning traps, and especially when they had long vertical legs attached to their outlets. They were often called 'syphons', and were so, in fact, under given conditions. Unless syphonage could be prevented, such traps would not only be useless, but dangerous. Though the D-trap and the 'Bower' trap were not syphoned with anything like the ease with which syphon-traps could be, they were by no means proof against the action of discharges through the pipes on which they were fixed. Syphonage of traps could easily be prevented by ventilating the traps. A great deal of ignorance prevailed on the subject of ventilation of pipes and traps, and that, too, among men who considered themselves sanitarians. Many of them simply ventilated the main waste or soil-pipe, but did not ventilate each individual trap. They insisted upon the soil-pipe being carried up full-size to the open-air, and in some cases they were willing to give it foot-ventilation; but no stack of waste-pipe or soil-pipe was properly ventilated which was not exposed to the atmosphere at both ends, and which had not, in addition, each trap ventilated. Bends in air or ventilating pipes, when made full-bore, made but a trifling difference in the ventilating capacity of the pipes; and it was therefore better to let such air-pipes follow the lines of the building, to a reasonable extent, than to stick up a hideous straight pipe, like a scaffold-pole with struts to support it.

The lecturer pointed out that Mr. Pridgin Teale, in his book on *Dangers to Health*, though he showed some valuable improvements on old plumbing practices, recommended an arrangement of bath and other wastes by which the water could easily be syphoned out of some of the traps, which would thus be not only useless, but dangerous. Plate ii in that book showed such a faulty arrangement. Having referred to numerous other diagrams and made several experiments in illustration of his remarks, the lecturer, in concluding, observed that those of his hearers who desired to push their inquiries farther, would doubtless have an opportunity of seeing and examining many traps and other appliances at the Medical and Sanitary Exhibition, which would be opened at Kensington in a week or two's time.

A hearty vote of thanks was given to the lecturer, and the Chairman announced that the specimens of plumbing work, made by the workmen attending the lectures in competition for the prizes offered in connection therewith, would be exhibited at the Exhibition mentioned, if sent in before the 12th of July.

THE

SANITARY RECORD.

JULY 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

RIVER WATER.

THE organic impurities in water have for some time past occupied much of the time and attention of scientific men; and as a result of so much labour we find more than one careful and elaborate method for the determination of the *amount* of these organic impurities, and several ingenious theories to account for the removal thereof from contaminated water by the processes of nature. But, as might be implied from the very fact of their multiplicity, no one of these processes or theories seems to be perfect in itself. It becomes then a matter of some importance to know the defects, as well as the advantages, of each process, and these have been recently well pointed out by Dr. C. Meymott Tidy in the Journal of the Chemical Society.

The estimation of organic impurity in water is a matter of importance and interest to two classes of men, viz., to the scientific chemist, and to the sanitarian. The former is anxious to discover the exact quantity, and if possible, quality of the impurities present, a task of immense difficulty, over which we hope to see him one day triumphant; whilst the latter asks only the simple question, 'May this particular water be safely consumed by human beings?' The sanitarian, therefore, is not much exercised by such considerations as the methods by which organic impurities are removed from water by nature. It is enough for him to know that they are so removed in process of time; neither will he demand extreme exactness as to the quantity of organic matter present in any given water. The great question to which the sanitarian must have an answer is, 'Is this water contaminated with sewage?' The importance of this question lies not in the poisonous properties of sewage as such. Probably healthy sewage sufficiently diluted, produces no symptoms of disease whatever in persons drinking the water which contains it. Probably, even if less diluted, the only symptoms produced would be slight diarrhœa. But the important point is this, where sewage is, there is a possibility, nay, a probability, of the presence therein of discharges from persons in various conditions of disease; and in some cases it is known that the discharges from the diseased person may communicate the same disease to a healthy person, into whose alimentary tube they have been introduced, *e.g.*, the poisons of typhoid and cholera. These diseases are said to be communicated by means of 'germs'. Now

here it becomes evident that the *quantity* of organic matter in a water is a matter of small importance to the sanitarian. Water may contain a large quantity of urea without being in any way poisonous, but if it contain *one* typhoid germ (and how much albuminoid ammonia would that germ yield), it may be the cause of an attack of typhoid fever to an apparently healthy person.

Unless it can be proved that there is a degree of dilution of the typhoid discharges, beyond which, the water containing them will in no case, and in no period within three or four days from the date of discharge, communicate the disease, and unless the proportion of organic matter contained in such diluted liquid can be fixed by some easily applied chemical process, where is the utility of informing us that the water contains so much albuminoid ammonia? What the sanitarian wants, is a delicate and unerring test for the presence of sewage, not so much quantitatively as qualitatively accurate and infallible. Water containing sewage must not be drunk, not because it is necessarily injurious, but because there is a possibility of its introducing into a healthy organism the germs of disease. Of course, in the case of waters which are *known* to be contaminated, and which must be consumed by large numbers of individuals daily, as is the case with Thames water, the *quantity* of organic impurity becomes an important item of consideration, since the chance of a few germs being contained in a tumbler full of the water is greater when the quantity of sewage present in it is large, but it certainly seems that the most practicable test is that of the determination of the chlorides and albuminoid ammonia, combined with a careful enquiry into possible sources of contamination, such as drains, etc., and especially a careful search for the remains of previous contamination in the form of nitrates and nitrites, since water which has once been contaminated with sewage may become polluted again, and should therefore be condemned. Meanwhile we must warn persons who are compelled for any reason to drink suspicious water for a time, always to boil it before using it for dietetic purposes, whilst those, whose means are sufficient, are advised to employ some of the natural mineral waters, these being in almost all cases above suspicion.

NOTES OF THE MONTH.

MR. GEORGE GODWIN AND SANITARY SCIENCE.

The presentation of the Royal Gold Medal for the present year to Mr. George Godwin, F.R.S., F.S.A., took place at the concluding meeting of the Royal Institute of British Architects for the present session, Mr. Street, R.A., President, in the chair. The Chairman, in making the presentation, took occasion to pay a just and graceful tribute to Mr. Godwin's literary and artistic work in the interests of architecture, and then went on to comment on the services rendered by Mr. Godwin as a pioneer of sanitary science, before the public were so convinced of its necessity and utility as they are at the present time. He pointed out that among the works for which Mr. Godwin is specially known are those which he has from time to time published on the subject of the crying evils of bad drainage, bad ventilation, and bad building, especially as these affect the condition and happiness of the labouring classes. He truly said that no more worthy work can be done; and though much,—very much,—still remains to be done before we can be otherwise than ashamed of our condition in this respect, to Mr. Godwin, as one of the pioneers of progress in such really vital work, no small honour is due. This recognition of worthy services will receive the adhesion of all who are acquainted with Mr. George Godwin's life-long efforts to obtain the amelioration of the evils pointed out in Mr. Street's remark, by his published works on the subject, and the constant attention given to them in his excellent journal, *The Builder*.

MR. HELLYER'S PRIZES FOR PLUMBING.

Mr. Hellyer has announced his intention of giving, in addition to the medals offered by the National Health Society, 50 copies of his book, *The Plumber and Sanitary Houses*, with prizes in money, to such journeymen handworkers who shall produce the best specimens of bent lead pipe, wiped soldered joints, and bossed-up lead breaks; and who shall in addition give rough sketches showing the best way of disconnecting soil-pipes and waste-pipes from drains, and of ventilating such pipes to prevent trap-syphonage.

THE SHONE PNEUMATIC SEWERAGE SYSTEM.

A successful demonstration of this system has just taken place in Paris under the auspices of the Paris Municipal Council, which was represented by one of its most skilled engineers. Through M. Alphand, Head Engineer and Director of Public Works, permission was obtained from M. Hérold, prefect of the Department of the Seine, to make a trial of the system at the Clichy outfall and filtering works. This trial was made in the presence of a large number of French engineers, and under the superintendence of M. Durand Claye, Engineer des Ponts et Chausées, and of Lieutenant-Colonel Jones, V.C., the chairman of the Shone Company. The system has already been fully explained in the SANITARY RECORD, vol. x, p. 53, and vol. xi, p. 67; its main feature being the use of compressed air to work one or more ejectors, each with an automatic valve, these ejectors being placed at any convenient points, and serving to raise the sewage any desired height. The Shone system does away with the necessity of deep cuttings and pumping stations, and can be worked at a single air-compressing station for a whole town, the air being conveyed by pipes to the various 'ejectors'. The ejector used for the Paris trial is one of the smallest size made, having a capacity of about ten cubic feet, and it was connected on one side with the sewer, and on the other with a free discharge pipe. The air-compressor was such as is used in the Westinghouse brake, and was lent for the purpose by Mr. Sturrock, the Parisian manager of the Westinghouse Brake Company. The compressor was some 300 yards away from the ejector, connected with a boiler close at hand, and on the signal being given soon raised the pressure required. The ejector had been allowed to become full of sewage, which had raised the bell float connected with the automatic valve, and allowed the air to rush in. The sewage was at once ejected through the discharge pipe 25 ft. high. In less than one minute the automatic valve was observed to move

over and the discharge to cease. A rush of compressed air out of the small pipe prepared for the purpose indicated that the charge had done its work, and that the weight, hitherto to some extent supported by the liquid in which it had been immersed, had quietly dropped back the float to which it is attached, and prepared the ejector to receive another charge of sewage gravitating into it in less than half-a-minute. The whole operation of filling and emptying was regularly completed in periods of about 75 seconds, and the air-pump was quite able to have done more than keep up the low pressure required continuously. It is well known that pressures of several atmospheres are regularly and economically maintained every day for mining and tunnelling purposes, and there can therefore be no difficulty in extending the application above described to the movement of volumes of water, however large, to any required height. In the opinion of those who witnessed the trial, the latter gave every satisfaction, and demonstrated clearly the certainty of action and the value of the practical application of Mr. Isaac Shone's invention.

OASIS IN THE DESERT.

Mr. F. G. Heath, having seen it stated in several newspapers, that the beautiful plane-tree in Stationers' Hall Court was to be destroyed to make way for buildings, wrote at once on the subject to Mr. Joseph Greenhill, the courteous secretary of the Stationers' Company. That gentleman assured him that this tree, which belongs to the Company, 'will not be interfered with by their arrangements for building.' Mr. Greenhill adds the interesting statement, that the plane was planted by himself fifty-five years ago. It would, indeed, be a circumstance to be deeply regretted, if one of the most quaint and beautiful ornaments of the City proper were destroyed, except under the most pressing necessity. The public have much reason to be grateful to Mr. Heath, who is a most vigilant custodian of all the sylvan beauties in and near London.

THE PLAGUE IN INDIA SHAWLS.

United States Consul G. H. Heap, calls the attention of the Government of the United States to the continued prevalence and extension of the plague, in the region about the lower Euphrates. A point of great interest in the report is the attention it calls to the danger of infected articles being received from districts mentioned in former dispatches. Shawls, rugs, and carpets coming from these districts are usually packed in close bales, and not opened till they reach their port of destination in Europe or America. Such articles are frequently those which have been in use by families in which a death from contagious disease has occurred, and induced a sale of effects regarded as dangerous. Italy, Russia, and Egypt have appreciated the danger, and taken measures to guard against infection from this source.

SANITARY AFFAIRS AT HEXHAM.

We are glad to learn that Dr. Jackson, who evoked the hostility of certain members of the Hexham Local Board by the straightforward manner in which he occasionally reminded them of their remissness of duty, has not suffered for his courage, and has been re-elected Medical Officer of Health to that body. This issue is alike honourable to Dr. Jackson and to the Board he serves.

POISONOUS BEVERAGES.

A Reuter's telegram announces, that a whole boatload of persons out for a picnic at Warensburg, U.S.A., who partook of lemonade, were poisoned by it; eight of them are reported in the telegram to be dead, and one hundred others in a critical condition. No indication is given of the nature of the poison It was very probably a mineral poison; the source of danger in drinks of the kind are two-fold, being due either to incidental impurities in the ingredients, whether acids or salts, or to their action upon the mechanical fittings of the bottles in which they are enclosed, or to the apparatus in which they are made, and the consequent production of symptoms of lead-poisoning. Sometime since, public attention was much directed towards the subject. Considerably more or less important quantities of lead were found to be frequently present in the artificial lemonades of commerce, and in other artificial aërated waters. It is probable in this case, however, that some much more considerable accident had occurred, and that deaths were due to the substitution of a toxic material for that which was intended. Organic and mineral impurities are not the worst enemies which the consumers of artificial waters have to fear, when these waters are not prepared from sources of the utmost purity. There is a well-known case, in which a shooting party who partook freely of artificial mineral waters, were, on separating, attacked in their different homes by typhoid fever, which was traced by the Medical Officer of Health to the organic impurity of the drinks which they had been consuming. The occurrence of startling incidents such as these, serve especially to direct attention to the advantages of an absolutely pure natural mineral water. One of the first circumstances which gave the great impulse to the popularity which Apollinaris water has now so largely achieved, and so firmly established, was the public statement of an eminent hospital physician in London, a Fellow of the Royal Society, in which he described how he had himself been suffering for many months from chronic symptoms of poisoning, of which he was unable to determine the source, until having identified the cause of his disease as being lead-poisoning. He succeeded in tracing it to his habitual use of soda-water in syphons. The soda-water had taken up enough lead from the fittings of the syphons in which it was bottled, frequently for long periods before use, to produce the symptoms of chronic lead-poisoning.

TREATMENT OF THE SUPPOSED DROWNED.

The *British Medical Journal* reports a lecture delivered by Dr. Benjamin Howard before the British Medical Association on the 'Direct Method of Artificial Respiration for the Treatment of the Supposed Drowned.' Dr. Howard, finding that the directions recommended by the Royal Humane Society worked unsatisfactorily, were in many respects difficult for other than medical men to follow out, and required the co-operation of at least two persons, investigated the whole question of the treatment of the apparently drowned, and in this lecture sets forth his objections to the whole system, and his arguments in favour of that proposed by himself. His rules are short and simple, being as follows: Instantly turn the patient downwards with a large roll of clothing under stomach and chest. Place one of his arms under his forehead so as to keep his mouth off the ground. Press with all your weight two or three times, for four or five seconds each time, upon the patient's back, so that the water

is pressed out of lungs and stomach, and drains freely out of the mouth. Then quickly turn patient face upwards, with roll of clothing under back just below the shoulder blades, and make the head hang back as low as possible. Place patient's hands above his head, kneel with patient's hips between your knees, and fix your elbows firmly against your hips. Now—grasping lower part of patient's naked chest—squeeze his two sides together, pressing gradually forward with all your weight, for about three seconds, until your mouth is nearly over mouth of patient; then, with a push, suddenly jerk yourself back. Rest about three seconds; then begin again, repeating these bellows-blowing movements with perfect regularity, so that foul air may be pressed out and pure air be drawn into the lungs about eight or ten times a minute, for at least one hour, or until the patient breathes naturally. These directions must be used on the spot, the first instant the patient is taken from the water. A moment's delay, and success may be hopeless. Prevent crowding round the patient; plenty of fresh air is important. Be careful not to interrupt the first short natural breaths. If they be long apart carefully continue between them the bellows-blowing movements as before. After breathing is regular let patient be rubbed dry, wrapped in warm blankets, take hot spirits and water in small occasional doses, and then be left to rest and sleep.

THE PUBLIC HEALTH
DURING JUNE 1881.

THE mean temperature during June at the Royal Observatory, Greenwich, was 58°.9, and 0.9 above the average June temperature in 100 years. The first four days of June were warm, while the temperature on the seven following days was continuously below the average; during the remainder of the month, the mean alternated frequently between excess and deficiency. The mean showed an excess on thirteen of the thirty days in the month, whereas a deficiency prevailed on each of the remaining seventeen. The warmest day during the month was Saturday, 4th, when the mean was 68°.1, and showed an excess of 10°.0. The coldest day was Thursday, 9th, when the mean was only 47°.8 and 10°.7 below the average. Rain was measured at Greenwich on but nine of the thirty days in the month; and the aggregate amount was 1.9 inches, being slightly below the average June rainfall in sixty-one years. The rainfall during the first half of this year amounted to 9.5 inches at the Greenwich Observatory, and was 1.3 inches below the average amount for that period. The sun was above the horizon during 494.5 hours in June, and 139.6 hours of bright sunshine were recorded at Greenwich; this amount was less by 62.6 hours than the exceptional amount recorded during May, and was 4.6 less than the average amount in June of the four years, 1877-80. The direction of the wind was very variable throughout the month.

In twenty of the largest English towns, dealt with in the Registrar-General's weekly return, 25,624 births and 14,087 deaths were registered during the five weeks ending 2nd inst. The births were equal to an annual rate of 35.1 per 1,000 of the aggregate population in the twenty towns, estimated from the numbers enumerated in April last; the rates in the three preceding months were 37.5, 35.3, and 35.5 respectively. The birth-rate last month did not exceed 33.8 in London, whereas it averaged 36.5 in the nineteen large provincial towns. It ranged upwards from 28.6 and 31.8 in Brighton and Norwich, to 40.0 in Sheffield, 40.1 in Sunderland, and 43.5 in Leicester.

The annual death-rate in the twenty towns during the five weeks of June averaged 19.3 per 1,000 of their estimated population, against 22 0 and 20.3 in the two preceding months. The June death-rates in these towns in the three years 1878, 1879, and 1880 were respectively 21.3, 19.3, and 19.1 The mean death-rate in these towns last month, therefore, scarcely differed from that which prevailed in the corresponding periods of 1879 and 1880.

The lowest annual rate of mortality in the twenty towns last month was 15.8 in Brighton. The rates in the other towns ranged in order from the lowest, were as follow: Plymouth, 16.2; Wolverhampton, 16.4; Nottingham, 16.6; Hull, 16.8; Birmingham, 18.0; Salford, 18.1; Portsmouth, 18.2; Leeds, 18.5; Leicester, 18.5; Bristol, 18 6; Newcastle upon-Tyne, 18.8; Sunderland, 18.9; Bradford, 19.2; London, 19.3; Norwich, 19.4; Oldham, 20.1; Sheffield, 20.3; Manchester, 21.2; and the highest rate during the five weeks was 23.4 in Liverpool. In the nineteen provincial towns, which have an aggregate population very slightly less than that of London, the annual death-rate during June averaged 19.3 per 1,000, and corresponded with the rate that prevailed in London. The comparatively high rates in Sheffield and Liverpool were in great measure due to excessive zymotic fatality, whereas in Manchester the rate from zymotic diseases was below the average.

The 14,087 deaths from all causes in the twenty towns, during the five weeks of last month, included 2,248, or nearly 16 per cent., that were referred to the principal zymotic diseases. Of these, 513 resulted from measles, 445 from whooping-cough, 358 from diarrhœa, 385 from small-pox, 304 from scarlet fever, 145 from 'fever' (principally enteric), and 98 from diphtheria. Those 2,248 deaths were equal to an annual rate of 3.1 per 1,000 in the twenty towns during the five weeks under notice, and showed a further increase upon the rates from the same diseases prevailing in the three preceding months, which were 2.1, 2.6, and 2.9 per 1,000 respectively; this increase was mainly due to the greater fatality of measles and diarrhœa. The zymotic death-rate last month was equal to 3.6 per 1,000 in London, whereas it did not average more than 2.5 in the nineteen provincial towns, among which it ranged from 0.8 in Brighton, 1.3 in Sunderland, and 1.4 in Bradford, to 3.4 in Sheffield, 3.7 in Portsmouth, 4.1 in Liverpool, and 4.2 in Leicester. Measles and whooping-cough caused the excess of zymotic fatality in Sheffield; diphtheria, whooping-cough, and enteric fever in Portsmouth; and measles and whooping-cough both in Liverpool and in Leicester.

Measles was again the most fatal zymotic disease in the twenty towns last month, causing 513 deaths which were equal to an annual rate of 0.70 per 1,000, against rates increasing steadily from 0.27 to 0.74 in the four preceding months; the highest death-rates from this disease were 1.4 in Sheffield, and 1.5 both in Bristol and Liverpool. Small-pox caused 385 more deaths in London, 15 in Liverpool, 2 in Brighton, and 1 each in Manchester, Oldham, Bradford, Hull, and Newcastle-upon-Tyne; no fatal case was recorded in any of the twelve other large provincial towns. The prevalence of small-pox in London, judged by the returns of the Metropolitan Asylum Hospitals, showed a decline during the latter part of June. The number of small-pox patients under treatment in these hospitals, which had steadily increased during the seven preceding months from 105 to 1,552, were 1,408 at the end of June, of whom 428 were accommodated at the Convalescent Camp Hospital at Darenth. The average weekly number of new cases of small-pox admitted to these hospitals, which had increased from 20 to 262 in the eight preceding months, further rose to 317 during the five weeks of June. The annual death-rate from small-pox in London, which had been equal to 0.36, 0.53, and 0.61 in the three preceding months, declined again to 0.53 during June, when the largest proportional fatality of small-pox again occurred in the south and east groups of metropolitan registration districts. Whooping-cough caused 445 deaths in the twenty towns last month, showing an increase of fatality upon that recorded in recent months; 164 of these deaths occurred in London, while 281 were recorded in the nineteen provincial towns. The death-rate from whooping-cough averaged 0.61 in the twenty towns; it was equal to

1.2 in Sheffield, 1.3 in Birmingham, and 2.2 in Leicester. The deaths from diarrhœa began to show a marked increase in the latter part of June, and the death-rate from this disease during the month was more than double that which prevailed in the three preceding months. The fatality of scarlet fever also showed an increase, and caused an annual rate of 0.42 per 1,000; it was proportionally highest in Nottingham and Hull, in each of which towns the rate was equal to 1.1 per 1,000. Fever (principally enteric), caused 145 deaths in the twenty towns during June, equal to an annual rate of 0.20 per 1,000, which was lower than the death-rate from this cause in any recent month. The highest death-rates from fever occurred in Portsmouth, Liverpool, and Hull. The deaths referred to fever in London were but 53, whereas 92 were recorded in the slightly smaller aggregate population of the nineteen towns. The 98 deaths referred to diphtheria in the twenty towns were equal to an annual rate of 0.13 per 1,000, corresponding with the rate that prevailed in May; no fewer than 62 were registered in London, while only 36 occurred in the nineteen towns, which included 18 in Portsmouth, 4 in Liverpool, and 4 in Oldham. Diphtheria continued to show epidemic fatality in Portsmouth, where no less than 62 fatal cases were recorded during the first half of this year.

The deaths of infants under one year of age in the twenty towns averaged 132 per 1,000 of the births registered during June, showing a slight increase upon the proportion that prevailed in May. Infant mortality during last month was equal to 132 per 1,000 in London, while it was 131 in the aggregate of the nineteen other towns; the proportion ranged upwards from 85 and 91 in Wolverhampton and Brighton to 154 in Liverpool, 156 in Leicester, and 175 in Norwich.

The fatality of diseases of the respiratory organs showed a further marked decline during June. The average weekly number of deaths referred to these diseases in London, which had steadily declined from 513 to 262 in the first five months of the year, further fell to 216 during the five weeks of June; this was 6 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London did not exceed 2.9 per 1,000 during June, against rates declining from 7.2 to 3.6 in the five preceding months. In Liverpool and Salford, the death-rate from the same diseases was equal last month to 5.5 and 3.2 per 1,000 respectively.

During the five weeks of June, the causes of 317 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner; these uncertified deaths were equal to 2.3 per cent. of the total deaths registered. The proportion of uncertified deaths did not exceed 1.2 per cent. in London, whereas it averaged 3.6 per cent. in the nineteen provincial towns. The proportion of uncertified deaths was smallest in Portsmouth and Leicester, whereas it showed the largest excess in Wolverhampton, Salford, and Oldham.

In the outer ring of suburban districts around London, having a population now estimated at 958,966 persons, the annual death-rate from all causes during June did not exceed 13.7 per 1,000, showing a further decline from the low rates prevailing in recent months. The annual death-rate from the principal zymotic diseases was equal to 1.7 per 1,000, corresponding with the rate in May. The fatal cases of small-pox registered in the outer ring during the five weeks of June were 35, against 12, 22, and 32, respectively, during the three preceding months. The death-rate from all causes and from the principal zymotic diseases within registration London during last month was, as before stated, 19.3 and 3.6 per 1,000. Judged by these mortality statistics, even after full allowance for exceptional age distribution, and other favourable conditions, the present sanitary condition of the metropolitan suburban district is evidently satisfactory.

SPECIAL REPORTS.

THE NORTH-WESTERN, NORTHERN COUNTIES, AND YORKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE last combined meeting of the North-Western, Northern Counties, and Yorkshire Associations of Medical Officers of Health, was held in York, to consider the question of infantile mortality from diarrhœa, Mr. S. W. North in the chair. It had previously been arranged that the discussion should be confined to the following points, viz.:—1st. The causes of diarrhœa, more particularly those indicating a specific or non-specific origin; 2nd. Is the infantile diarrhœa prevailing during the third quarter of the year a zymotic disease? 3rd. The pathology of uncomplicated diarrhœa. The meeting was not confined to members of the three societies, members of the medical profession specially interested being invited. Dr. H. F. Parsons and Dr. Ballard, two of the Medical Inspectors of the Local Government Board attended. There were also present—Mr. S. W. North, York; Dr. Shann, York; Dr. J. C. Reid, Newbiggen-by-the-Sea; Mr. H. Butterfield, Bradford; Dr. T. Brittan, Halifax; Dr. A. McCook Weir, Nottingham; Dr. R. B. Low, Helmsley; Mr. A. Bewicke, Preston; Dr. T. Scott, Ilkley; Mr. J. Mitchell Wilson, Doncaster; the Town Clerk of York, Mr. Joseph Wilkinson; Dr. Blackett, Durham; Dr. J. W. Eastwood, Darlington; Mr. Hicks, Easingwold; Mr. Shann, York; the Sheriff of York, Mr. Richard Thompson.

The CHAIRMAN said there was nothing to communicate to them since their last meeting, except the completion and opening of a very efficient Fever Hospital in the suburbs of the city. They were thus in a position to deal with any outbreak of infectious disease. There was at present accommodation for twelve patients, and they had land sufficient to enable them to double the size of the hospital if necessary. The institution was in working order; its entire cost, including the land, was £4,000. The hospital was in every respect well adapted for its purpose, and its erection showed that York was not behind other places in doing something for the prevention of infectious diseases.

SOME PREVALENT CAUSES OF INFANTILE DIARRHŒA.

Mr. J. C. REED, of Newbiggin, read an able paper on this subject. He said that irrespective of the influence of the seasons, feeding was a factor in the development of infant maladies. He referred to the carelessness of mothers and wet nurses with regard to their own food, and condemned the indulgence in the preposterous practice of consuming fermented liquors, under the erroneous idea that it increased the quantity and enriched the quality of their milk. Another error was, no matter how exhausted or excited the mother might be, she would put the child to the breast. He had repeatedly found this to be the cause of the child's illness. He next spoke of errors of food—first, improper articles of diet. Nature answered the question—What was best? The drinking habits of the parents were predisposing causes of infantile disease—they weakened the tone of the nerves, relaxed the muscular fibres, and otherwise operated injuriously. Such a subtle agent as alcohol, taken day by day, affected most perniciously the human frame. He referred to the prevalent drinking

habits of society, and showed that the germs of disease were thus implanted, to be matured into the seeds of death. A good night's sleep was the most suitable remedy for an exhausted frame, aching joints, or a jaded mind. The success of abstinence in obviating the approach of fevers had been noticed by the most eminent physicians from the time of Hippocrates to the present time. He proceeded to show that the best liquid a woman could use for the secretion of milk was oatmeal tea. Goat's milk he spoke highly of, and also the Anglo-Swiss condensed milk. The objection to new milk was the uncertainty of its quality, the mixing of one cow's milk with another. If it were not well scalded it was not an article to be commended. The wells in farmyards were too frequently so situated that the liquid from the manure percolated into them. But all these objections were as but a drop in the bucket compared with the vile custom of feeding milch cows on brewers' grains and distillers' wash. He quoted medical testimony to the injurious results of such a practice, and said that through such causes as he had pointed out, thousands of the infant population had been sent to premature graves. He also spoke of the evils of careless washing, and unnecessary exposure of infants. He said that what with the ignorance, carelessness, and unwillingness to be taught on the part of parents, the marvel was so many children lived. In conclusion, he said that the principal causes of disease must be sought for amongst those agents which most materially contributed to life.

Is Diarrhœa a Zymotic Disease?

Dr. A. McCook Weir, of Nottingham, read a paper on the above subject, in which he took exception to the present classification of infantile summer diarrhœa, and said that far more attention had been given by investigators to epidemic infantile diarrhœa as a disease *per se*, rather than as a very grave fatal symptom, frequently the terminal symptom, in long antecedent category of infantile disorders. He treated of these various disorders, and asked on what grounds were they justified in classifying one as a zymotic, another as a constitutional, a third as a local, and a fourth as a developmental disease, when they were all links in the same chain?

Infantile Diarrhœa from a Rural Point of View.

Dr. R. S. Low, of Helmsley, read the following paper on this subject:—

'It is with some diffidence that I bring forward what may seem a negative experience of infantile diarrhœa, but believing, as I do, that the evidence must be examined from all possible points of view, I beg to submit the following facts, taken from a purely rural and very thinly populated neighbourhood. Some writers lay great stress upon the predisposing causes of infantile diarrhœa—the improper feeding—the insanitary surroundings, foul air and filth—neglect and dirt, high temperature and seasonal influences. Now all these are present more or less in my district. For example, the newly-born children are often fed on bread and water. After a week old I have known them fed with boiled eggs, biscuits, and occasionally bacon. Some have that abomination, the sour bottle, to suck at all night. These varied articles of diet act as irritants, and produce an intestinal catarrh, resulting sometimes in death, but this is not the true infantile diarrhœa. Trousseau draws attention to the fact that weaned children are more liable to true infantile diarrhœa, and some writers have pointed out that illegitimate children are frequent sufferers. In my district the illegitimate birth-rate is high. I regret to say it is ten per cent. of the total births. These children are nearly always hand-fed, and are very often neglected, and even, in some cases, cruelly treated, so that they would seem to afford likely victims for this fatal infantile disease. The cottages are sometimes crowded, damp and dirty, having been built before the ordinary principles of dwelling construction had been understood; the garden privy behind the cottage is frequently neglected, unemptied and full of putrefying filth. I have had to investigate several severe outbreaks of contagious diarrhœa in adults and school children, clearly produced by the emanations of overflowing garden-privies, or from the pools of stagnant filth formed in front of the houses by the idleness or apathy of the inmates. These outbreaks have been completely arrested by cleaning out the privy or removing the stagnant accumulations. The infants were not special sufferers. Those who used the privies were always the victims, or those who had the misfortune to inhale the emanations from the recently passed stools. In spite of all these aggravated causes, the total deaths from diarrhœa in children during seven years, was only 3 out of a total of 53 deaths from all causes during the same period. The reason of this apparent immunity in my district from this frequent disease of childhood, may be explained by assuming the specific nature of the ailment, and that although the train is already laid, it cannot be fired until the spark, viz., the specific germ arrives. No doubt the bad feeding induces a congested state of the intestinal tube, and that when the specific germ is inhaled or swallowed, the congested mucous membrane is easily inoculated with the poison, just as the vaccine lymph is absorbed by the scratch on the arm. The total absence of this infantile diarrhœa in some places, and its constant appearance in other places, such as Leicester, is easily accounted for by the fact of the specific poison lurking in the sewers and cesspools of those towns. These specific poisons, which have the wonderful power of multiplying themselves to an almost indefinite extent, under, say, the influence of a high temperature in the summer and autumn months, fill the atmosphere of the infected houses, and are either inhaled or precipitated from the air into the milk and other food prepared for the infants; and if this food, as is often the case, is carelessly prepared some time before it is to be used, the poison has the opportunity of rapidly multiplying itself in the interval, and the unfortunate infant swallows a large dose of the specific contagion. The fact that babies at the breast so often escape is evidence in favour of this theory. If, however, we do not accept this specific germ theory, it is possible to believe that some of the ordinary microscopic organisms present in our atmosphere, here gain some power by feeding on foul air, and that by successive crops of these a contagion is developed by what Dr. Thorne Thorne calls "the progressive development of the property of infectiveness". The immunity of my district and others of the same nature from this infantile diarrhœa, may then be explained by believing that the contagion evolved in the way just described cannot retain its virulence owing to the absence of sewers or cesspools to form a habitation. Judging from my own experience, which is entirely negative, I am at present inclined to believe in the zymotic origin of infantile diarrhœa.'

The History of One Hundred Cases of Diarrhœa.

Mr. S. W. North, of York, read the following paper:—

'As a contribution to the subject of our discussion to-day, I propose to lay before you a simple statement of the facts, so far ascertained, which have relation to the outbreak of diarrhœa in this city during the summer of last year. During the months of July, August, September, and October, 137 persons died within the municipal area, of disease, of which diarrhœa was so prominent a symptom as to lead to its being assigned as the cause of death. Of these 137 deaths, 5 occurred in July, 64 in August, 62 in September, 6 in October; of the total, 60 were males and 77 females. The age at which death took place was as follows: Under three months, 19; under six months, 24; under twelve months, 32; under two years, 30; three years, 10; four years, 4; five years, 1; 75 being under a year. Of the remaining 17, 7 were aged five and under sixty, 10 were persons sixty years of age and upwards. As regards the duration of sickness in each case, in 44 cases it did not exceed a week;

in 24 cases it did not exceed two weeks; in 45 it was more than two weeks; in 24 no information was obtained. As to the question of diet of the 75 children under a year, 56 were fed entirely; 10 were suckled and fed; 2 were suckled; 7, no information was obtained. As regards the health of the parents, in 71 cases the health of both was good; in 9 illegitimate the mothers' health was good; in 25 one parent was ailing; in 4 both parents were out of health; 16 were aged persons; in 12 cases no information was obtained. Careful inquiry was made into the previous health of these victims to diarrhœa. In 52 cases it was said to be good; in 71 cases in various degrees bad; in 14 no information was obtained. As regards the social position of the families in which these deaths took place, only 6 belonged to the better class—that is, shopkeepers, etc. The remainder were artisans, or persons in a similar position. Not a single death occurred in the professional or independent class. As regards the habits of the people, there was abundant testimony that in a large majority of cases they were in every way satisfactory, and that the children were the objects of affectionate regard and consideration, even where their management might not be judicious. The chief articles of diet were milk, corn-flour, sago, arrowroot, and in a few instances condensed milk, but never solely. As to sanitary conditions, suffice it say that in a large proportion of cases no special sanitary defects were visible. The population of York during 1880 I estimate at 46,850, probably less than the real population. I offer these mere facts as a contribution to the business of the meeting. They constitute but a fragment of a much larger inquiry into the infantile mortality of York, the results of which I hope some day to submit to the Association. I have expressed no opinion as to the cause of the disease, because in the present state of my knowledge such opinion would be mere speculation. I feel convinced, before we can speak with anything like decision on this question, we need to have the results of a much wider investigation than has hitherto been made.'

The CHAIRMAN said the subject narrowed itself into a very small compass. The question was, is diarrhœa capable of prevention by any action which Sanitary Authorities can take, or is it a disease dependent on domestic circumstances and external causes, such as do not lie within the function of Sanitary Authorities? Statistics showed that where the population was dense diarrhœa was more prevalent. Hence, it seemed to him that sanitary conditions did affect the question. From his own experience, he said that in no single house where a fatal case of diarrhœa occurred had the food been kept in a proper storehouse or in a satisfactory condition.—Dr. BRITTON, of Halifax, said dentition had something to do with diarrhœa, for irritation of the bowels was caused by irritation of the gums. He believed it was more a domestic than a sanitary question. The dense congregation of people in close neighbourhoods was a great cause of infantile diarrhœa, for the children breathed over and over again the same vitiated atmosphere. He also spoke of the evils of back-to-back houses.—Dr. SCOTT, of Ilkley, pointed out that milk was not used by the people of China, and yet diarrhœa was most fatal there. He did not think that the density of population greatly affected the question, in proof of which he referred to several of the districts of London, where the rate of infant mortality was not the highest in the largest centres of population. He believed diarrhœa was due in a great measure to temperature, especially the temperature of food.—Mr. BUTTERFIELD, of Bradford, strongly condemned back-to-back houses. The causes of diarrhœa were exceedingly complex—due probably to a dozen factors, most of which had been referred to. He had noticed that diarrhœa was more prevalent in flat districts than hilly; there was, for instance, more diarrhœa at Hull than Halifax, the former being flat, whilst the latter was hilly. Diarrhœa was generated by putrefactive changes in the food of children, and excremental pollution of the atmosphere.—Dr. EASTWOOD, of Darlington, said that town had a comparatively small mortality, but there was a prevalence of diarrhœa at certain seasons. He condemned the feeding of infants on unwholesome food, and the use of 'soothing syrups'. He found the mortality greatest amongst the working-class population in the worst parts of the town. In the rural district around Darlington, embracing 40 parishes, there was a very considerably lower mortality than in the town. This showed that the disease was affected by the sanitary surroundings of the people. He spoke of the evils of overcrowding, back-to-back houses, closeness of buildings, and the impossibility in almost numberless cases of keeping milk properly.—Dr. BLACKETT, of Durham, said, if they wanted to kill children let them give them prepared food. Children could never thrive but on their own natural food, pure milk. Temperature and moisture had more to do with the causation of diarrhœa than any other thing, in proof of which he referred to the great prevalence of diarrhœa during the excessive rainfall of last autumn.—Dr. WILSON, of Doncaster, concurred in many of the observations of the previous speakers. He also said that in addition to great heat, a predisposing cause of diarrhœa was dirt.—Dr. PARSONS, who stated he attended the meeting in his private capacity as a member of the Association, and not as representing the Local Government Board, pointed out that much of the controversy respecting diarrhœa resulted from heterogeneous things being classed together under the same name. Diarrhœa was rather a symptom than a disease. A large number of children's diseases ended in diarrhœa, as a large number also ended in convulsions. As regarded the causes of diarrhœa, he said that if they had full particulars of the mode of causation they would not fall into any one class. In some cases it might be attributed to miasmatic, in others to dietetic, or constitutional, or local causes. After discussing these aspects of the disease, he said a bad smell would give rise to diarrhœa. He also did not think that sufficient prominence had been given to the absence of milk from children's diet, in the case of farinaceous food, etc. From his experience he had found that diarrhœa was more prevalent in the three years in which the rainfall was least. He pointed out that the disease was more frequent amongst the poor than the rich, which might be attributed to less favourable sanitary conditions, a deficiency of attention to the health and comfort of children, and to the neglect to send for medical aid at a sufficiently early stage of the disease. Diarrhœa in its earlier stages was easily cured, but if the disease became aggravated it was exceedingly difficult to cure. In conclusion, he strongly protested against the use of condensed milk, citing from experience its bad effects on infants. Milk should be boiled before being given to children.—The CHAIRMAN said the discussion showed a great variety of opinion, and demonstrated the need of special medical consideration of this important question.—Dr. BALLARD, Medical Inspector of the Local Government Board, then said he had been at a great deal of trouble in considering what diarrhœa was, and its causes. A great deal of what had been said about the nature of diarrhœa was no doubt true, and a good deal of what had been said about the variety of its causes was also true. They must, however, recollect that it was not only a fatal infantile disease, which made a big mountain of mortality in the

summer; it was a disease which affected all ages—young babies, youth, middle age, and old people. At the same time, it affected children more than grown-up people. They wanted to know really what diarrhœa was, and whether due to zymotic or other causes. He frankly confessed his lack of any precise knowledge on these points, and said that he was going to try to find out the true answers to these questions. The first thing was to obtain its clinical history, and then to go on to inquire into its pathology and causes. In prosecuting this inquiry on the part of the Local Government Board, he had met with considerable encouragement. He had a list of about one hundred gentlemen who had offered their services to him, and who would work thoroughly well in this inquiry. They already knew that fatal diarrhœa was a summer disease; a disease of towns rather than the country; of big towns rather than small towns, and of certain parts of towns in contradistinction to other parts. It was very easy to hear of the fatal cases, but he wanted to hear about the cases which were not fatal. The cause of diarrhœa as a disease, and the cause of the fatality of diarrhœa, were two separate things. He specially wished to ascertain the cause of diarrhœa as a disease. Here he was thrown into a great many directions of inquiry, in reference to which he expressed his regret that so many medical men did not keep notes of the cases they attended. The records which were kept by those in a public capacity were also very defective indeed, and he enforced the importance of Medical Officers of Local Authorities, and those in connection with Poor-law Unions, keeping accurate records of their cases. In order to assist them to do that, and to assist medical men in public practice, he had prepared certain little books, which could be carried in their pockets, and which were furnished with questions, the answers to which would be of primary importance to the inquiry which would this year be carried on. Dr. Ballard exhibited a specimen of this record, which was generally approved by the medical gentlemen present. In conclusion, he said that he was preaching a crusade, that he was anxious to form a band of earnest workers, and that he earnestly asked for the co-operation of all those interested in this important inquiry.

NORTH-WESTERN ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE annual meeting of the members of this Association was held in Manchester, at the office of the secretary, Mr. F. Scott. Dr. M'Nicholl, president, occupied the chair. The hon. secretary, Mr. Vacher (Birkenhead), read the report, which recorded the success of the Association, and stated that it had been of great service to Medical Officers of Health and the public generally during the six years that it has been in existence. Three new members have joined the Association during the past year, there now being in connection with it four honorary members, twenty associates, and thirty members. The report and treasurer's statement having been adopted, the officers and committee for the ensuing year were elected, Dr. Kenyon (Chester), being appointed president, Dr. Hughes, (Ashton-under-Lyne), vice-president, Dr. Pettinger, (Stretford) treasurer, and Mr. Vacher (Birkenhead), hon. secretary. A vote of thanks having been passed to the officers for the past year, the chair was taken by the new president, Dr. Kenyon, who read a paper on 'The Medical Officer of Health and his work', (published at page 12).

Dr. Samelson, on behalf of the Committee of the Manchester and Salford Sanitary Association, submitted the draft of a memorial, which, it was proposed, should be sent to the Local Government Board on the subject of contamination of milk. The memorial had been prepared by Mr. Vacher, of this Association, and Dr. Ransome, of the Sanitary Association, but the Committee of the latter Society, who had not time to consider fully the proposals of the memorial, could only say that they would give the action suggested a general support. It was agreed that the subject being a somewhat difficult one, Mr. Vacher should be requested to prepare a paper on it, to be read at the next meeting, and embody in it the proposals contained in the memorial.

It was reported that at a recent special general meeting it had been resolved to reduce the subscription for membership of the Association from £1 1s. to five shillings, with a view to increasing the number of members. Laymen and others who are not medical officers are eligible for membership as associates.

DOMESTIC ECONOMY CONGRESS.

A CONGRESS for the purpose of promoting the teaching of Domestic Economy in Elementary Schools, has been held in connection with the Society of Arts. An Executive Committee was appointed by the Council, and by their assistance an influential committee of ladies was formed, under the presidency of H.R.H. Princess Christian. The Congress was opened on the 20th June, by a *Conversazione* in the Royal Albert Hall, which was largely attended. The meetings for the reading and discussion of papers were held in the rooms of the Society and in the Albert Hall, on the following days of the week. The subjects discussed included 'Methods of Teaching and Examining Domestic Economy', 'Needlework', 'Food and Cookery,' 'The Dwelling', 'Health', and 'Thrift'. Fifty-six papers were contributed under these different heads, and were read in the various sections, under the presidencies of the Countess of Airlie, the Duchess of Leeds, the Countess Spencer, the Viscountess Strangford, the Dowager Lady Stanley of Alderley, Lady Reay, and Mrs. Dacre Craven. Her Royal Highness the Princess Christian of Schleswig Holstein presided at the delivery of Mrs. Buckton's lecture, (published at page 1), and cordially acknowledged the information and gratification she had derived from hearing it. Her Royal Highness has expressed her satisfaction at continuing at the head of this movement, which she considers to be of the very highest national importance to all subjects of the Queen.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BIRMINGHAM.—An elaborate series of tables given by Dr. Hill indicates that rapid progress continues to be made in the sanitary condition of this important borough. The work of conversion of the injurious midden privies to pan-closets is progressing, whilst the night-soil and refuse removal is carried on in an energetic manner, no less than 69,256 loads of ashes being removed from the tubs during 1880. Nearly 1,500 drains were trapped, 690 sinks disconnected from the drains, 150 privies reconstructed, and 1,004 accumulations of manure and other filth removed within the same period. During the year 2½ miles of sewers were constructed, making a total mileage of 175½ of sewers under the charge of the Town Council. The common lodging-houses were regularly inspected, the inspection necessitating no less than 13,546 visits, 3,182 of which were made at night. The slaughter-houses too, received attention, whilst an inspection of the dairies, cow-sheds, and milk shops, under the order of 1879, resulted in many of them being closed, as deficient in necessary accommodation. Much, however, remains to be done, especially as regards the old dilapidated property existing in some parts of the town, the numerous midden privies still remaining, the erection of houses on foundations of house refuse and road scrapings, and the imperfect disconnection of houses from the sewers. The provision of a

public abattoir is, too, a matter of urgent necessity. The death-rate for last year (20.5 per 1,000) is the lowest recorded for sixteen years, but the mortality among children under one year is still excessive. This is, in part, to be explained by the unusual fatality from infantile diarrhœa last year, which alone caused 777 deaths. With the exception of whooping-cough, the other zymotic diseases show a satisfactory decline.

BOURNEMOUTH.—This town still maintains its prestige as one of the best of our health resorts. Last year 264 deaths were registered, 116 of which occurred amongst visitors. The heaviest mortality arose from diseases of the chest, 73 being attributed to phthisis, and 46 to bronchitis, pneumonia and pleurisy. In referring to these deaths from diarrhœa, all of which occurred in children under one year of age and in the third quarter of the year, Mr. Nunn draws attention to the want of care exercised by farmers and graziers, as regards too sudden change in the food of their cows, and he says he has observed that the milk of cows allowed to graze in rank green pastures, or on green rye, after having been accustomed to a much drier food, produces in delicate persons and children serious purgative effects. Considerable improvement has been made in the sanitary condition of the town. Street scavengering was well carried out during the year, but the present system of tipping ash refuse in certain parts of the district cannot fail to prove injurious. The water-supply obtained from the company was, on the whole, very good, but imperfect filtration occurred in the summer; five polluted wells were closed during the year. An improvement is noted in the condition of slaughter-houses, and it is satisfactory to learn that the drainage, etc., of hotels and lodging-houses was the subject of special attention. The sanitary condition of the different schools is stated to have been fairly satisfactory, though Mr. Nunn expresses the opinion that a further improvement could be effected by a more stringent sanitary control over them.

BRANDON AND BYSHOTTLES.—In this district, as in the Durham Rural Sanitary District, the mortality last year was considerably increased by the prevalence, in an epidemic form, of scarlet fever, measles, and whooping-cough; which diseases alone caused 62 deaths. Infantile diarrhœa was fatal in 22 cases, most of which occurred in the third quarter of the year, and was, in Mr. Blackett's opinion, due to atmospheric causes favouring decomposition and putrefaction of food, and the depression of the vital powers. The record of sanitary work is incomplete in consequence of the unreliable record left by the late sanitary inspector. Some action appears to have been taken, though not in the directions most wanted.

BRADFORD (YORKS).—This excellent report is quite equal to those which have preceded it from Mr. Butterfield's pen, and it shows him to be working energetically and well under somewhat difficult circumstances. Last year a satisfactory low death-rate of 29.9 was recorded, a decrease of 2.7 on the average of the previous six years. Sanitary improvement was carried on with considerable energy. Systematic inspections were made of all parts of the borough, and nuisances which existed were rapidly removed. One of Fryer's patent destructors was, in accordance with the resolution referred to in the previous report, erected, and others are to be provided in other parts of the borough. In 138 cases drains were provided for premises previously without them, 942 sink-drains were disconnected from the sewer or efficiently trapped; and under the provisions of the Local Act of 1875, 535 houses were examined by the health officer before they were allowed to be occupied. In 48 of these cases the certificates were withheld on account of dampness, or other defects. In the first quarter of the year the average death-rate was 21.5 per thousand, in the second 19.2, in the third 22 4, and in the fourth 20.5. The excessive mortality in the third quarter is attributed to the epidemic prevalence of scarlet fever, and the persistent mortality from diarrhœa. In addition, whooping-cough was largely prevalent. A noticeable decline was observed in the deaths from tubercular diseases, the total number being 491, as compared with 514 and 549 respectively for the two previous years. The passing last year of the Local Act, making notification of infectious cases compulsory, will be a further help to Mr. Butterfield in his praiseworthy endeavours to ameliorate the sanitary condition of the town.

CALCUTTA.—The deaths in this city during the first quarter of the present year exceed the mean by 362. The mortality from fevers (1,092) shows a decline, and that from diarrhœa and dysentery, although still slightly in excess, was lower than the quarterly totals of 1876, 1878, and 1879. Small-pox was fatal in 74 cases, a comparatively low number, due, no doubt, to the progress which vaccination is making in the district. During the quarter 4,321 operations were performed, 3,472 of which were successful, and still more favourable results are expected by Dr. MacLeod, when the new arrangements are in thorough working order. An important improvement is noted in the sanitary condition of the markets; no license being granted until a special inspection has taken place and any defects remedied.

CHAILEY RURAL.—Last year the birth and death-rates in this district were equal to rates of 32 and 14 per 1,000 respectively. Fifteen deaths are returned as due to zymotic causes. There was a considerable diminution in the mortality from fever, and an entire absence of diphtheria. The briefness of the report is explained by the prolonged illness of Mr. Gravely, who again urges the importance of bye-laws for preventing the erection of jerry-buildings, and draws especial attention to the importance of a proper damp course, 'the absence of which in most of the cottages already built renders them so damp and unhealthy, and which is really of as much importance as proper drainage and ventilation.'

CHELTENHAM.—The report on this district reveals a state of affairs by no means creditable to the sanitary authority. For five years, Dr. Wright states, has the subject of bye-laws relating to the prevention of nuisances and to the keeping of animals, been under discussion, and yet it remains unsettled! Attention is also drawn to the condition of the public slaughter-houses, and to the necessity of a public abattoir. Some sound remarks are made with regard to the dangers of imperfect house drainage, and it is satisfactory to learn that improvement is being made in this respect. The water-supply has been extended, and new bye-laws with respect to common lodging-houses have been passed. Considerable progress has been made in ameliorating the condition of cottage property, but much still remains to be done. The estimated population of Cheltenham is given at 45,000. The total births were 1,076 (of which 72 were illegitimate), and the total deaths 886, showing a net gain to the population of 190. After due correction for persons coming into the district with their fatal illness upon them, Dr. Wright calculates the death-rate as 18.6 per 1,000. The Delancey Fever Hospital (provided by private charity), seems to be in want of funds, and, looking to the great advantage which the possession of such a building has been, and is likely to be, to the town, the sanitary authority should surely need no second appeal for an annual contribution to maintain the institution in its present efficiency.

EAST DEREHAM.—The death-rate for this district last year was 16.4 per 1,000, more than a fourth of which was in infants under two years of age. Nearly half of these infantile deaths were registered as due to 'debility from birth', a mortality which Mr. Vincent finds it difficult to account for, though there was striking numerical relationship between it and the number of illegitimate births. Twelve were due to zymotic diseases, 6 of which were from scarlet fever. This disease was indeed epidemic in the district, and Mr. Vincent complains of the ignorance of parents in regard to the disease, and suggests as the only possible means of suppressing it, the compulsory notification of infectious diseases. The health officer appears to be well acquainted with the sanitary condition of his district, and to have been instrumental in securing many improvements in it.

HEXHAM URBAN.—Hexham still maintains the unenviable notoriety as being one of the unhealthiest of English towns, a position which it has held for the last

thirty years. According to Dr. Jackson the death-rate remains steadily fixed at 60 per cent. above its proper amount. Last year a death-rate of 27.8 per 1,000 of the estimated population was reported. An analysis of this mortality shows that 20.93 per cent. of the total deaths were due to zymotic diseases, and 20.35 per cent. to diseases of the respiratory organs, whilst 36.04 per cent. occurred in children under five years of age. Alluding to this alarmingly high death-rate, Dr. Jackson justly observes that, 'It will be in vain to hope for a lowering of the death-rate so long as there remains in the town so large a number of old tenemented dilapidated houses with damp walls, floors, and yards, and without thorough ventilation; so long as slaughter-houses of the worst possible type are unsuppressed; so long as there is no reliable and effective cleansing of the public sewers, so long as the house drains are chiefly drains of deposit, and the bye-laws for the proper erection of new buildings are not enforced.' In spite of reiterated remonstrances, the retrograde practice of permanently closing man-holes in streets, when a bad smell indicates the foulness of the sewers below, is still persisted in; and moreover, the sewer outlets are 'practically stagnant cesspools!' During the year 500 yards of new sewers were laid down, but the present public sewers are not properly cleansed and ventilated. The water-supply has been provided from a source condemned by a Local Government Board inspector, in opposition to one which he approved after a careful inquiry. The result is naturally unsatisfactory, in fact the present supply is reported as not fit for drinking, being composed chiefly of flood water, contaminated with farm sewage. No hospital accommodation exists, and during an epidemic of scarlet fever, which was fatal in 22 cases, the workhouse fever wards were used until the breaking out of the disease in the house itself prevented the farther use of the wards for patients from the town. Hexham is evidently a place that needs the especial and sustained attention of the Local Government Board. It is monstrous that through the idleness and nonchalance of its soi-disant 'sanitary authority' matters should remain in the scandalous condition that Dr. Jackson describes.

HOLSWORTHY RURAL.—Sanitary work progresses throughout this district, although the action is somewhat tardy. Mr. Linnington Ash urges the provision of a disinfecting apparatus, and of hospital accommodation, and the sanitary authority would do well to see that his suggestions are immediately carried out, both in this respect and in others. Nuisance removal and excrement disposal were well attended to during the year, but many places are very unsatisfactory in this last respect. The drainage at Pyworthy is old and defective, but the extension of the main sewers has considerably improved the drainage of the various parts of the district. The general death-rate (19.62 per 1,000), although below the average of the last six years, is unduly high; 40 per cent. of the total deaths occurred amongst people aged sixty years and upwards. The zymotic death-rate was 3.50 per 1,000, a rate in excess of the average of all England. This is explained by the fatal prevalence of measles and scarlet fever, which were both epidemic during the year in nearly all parts of the district. The wide-spread area over which they raged is attributed to the carelessness of parents, and to the ignorant belief which exists amongst the population that these diseases are incidental to human existence, and that everyone must at some time or the other endure them. Mr. Ash states that in pursuance of this belief he has known children actually placed in contact with the diseases, when a mild form of them is thought to exist.

KENDAL.—For this borough Dr. Page reports the extraordinarily high death-rate of 23.2 per 1,000, against a rate of 17.8 for 1879. This excessive mortality was due almost entirely to a very severe epidemic of scarlatina, and a concurrent outbreak of measles. The previous epidemic of 1874-5 in this country had passed over Kendal without harm, and for the last ten or eleven years scarlatina had been merely of sporadic occurrence there. In the next most recent epidemics, on the other hand, scarlatina proved particularly fatal, causing 62 deaths in that of 1867-8, and 55 deaths in the epidemic of 1862-3. Last year 56 persons succumbed to this disorder, no less than 247 persons in 150 families being attacked. Dr. Page gives a very thorough and interesting account of the progress of this disorder, and bewails very earnestly the absence of a hospital in which the cases could have been isolated. There was a diminution in the number of deaths of infants under one year of age; but no less than 93 deaths, or 28 per cent., were of children between one and five years of age, and it was upon this group of ages that the stress of the mortality from scarlatina fell. It is satisfactory to note an absence of fatal summer diarrhœa, only 2 deaths being returned as due to this cause. Phthisis, and diseases of the lungs and heart accounted for nearly one-third of the total mortality. The epidemic of scarlatina demonstrated, with fatal force, the necessity for hospital accommodation for the isolation of fever patients. Dr. Page quotes a number of instances in which the community, in its absence, had to incur the 'unmitigated risks of infection', and rightly adds that 'the absence of such accommodation from the sanitary organization of the town implies a condition of hopelessness which cannot be relieved by the casual visit of an inspector, a package of carbolic powder, or a bottle of Condy's fluid.' Very late in the epidemic the Urban sanitary authority negotiated with the guardians for the use of the fever wards attached to the workhouse as a means of isolation, but these wards would seem to be quite unadapted for the purpose. The arrangements in Kendal for excrement disposal are by no means satisfactory, whilst in the matter of house drainage no less than 50 per cent. of the drains communicate directly with the sewers. A step in the right direction has been made by the local authorities in undertaking the removal of house refuse.

MAIDSTONE.—Mr. Adams has to confess, somewhat unwillingly, that but little progress has been made in the sanitary condition of the borough under his charge. But the fault hardly lies with him. The sewerage scheme, over which he has spent considerable time, works unsatisfactorily, apparently owing to errors of design, faults of construction, misuse of the sewer, and to other causes. Attention is called to the water-supply, and to the danger of contamination, which threatens the supply from the public conduit. In Tovil there is an absolute necessity for a good supply. Notwithstanding its manifold defects, the cottage hospital of the town was of much value last year in isolating cases of infectious disease. No less than 10 cases of small-pox, 18 of scarlet fever, and 8 of typhoid have been treated, with only 2 deaths, whilst the administration won the admiration of the Central Board inspector. The total number of births was 957, and of deaths 557. Of the latter whooping-cough caused 8 and diarrhœa 38. With these exceptions the death-rate is satisfactorily low. Mr. Adams attributes the excessive mortality from diarrhœa mainly to 'putrescent changes and improper food the changes being set up by high temperature, and the miasma which abounds in urban districts in the summer season.' The borough was invaded no less than four times by small-pox, and an illustration is given of the spread of the disease by rags.

SALTLEY.—The most striking feature in the death statistics of this district is the enormous proportion of infantile deaths, no less than 50 out of a total of 127 deaths being amongst infants less than a year old. Mr. Cresswell ascribes this excess to the ignorance of mothers as to the proper nurture of their children, and he, very properly, proposes to circulate a pamphlet giving directions on this subject. Scarlatina was somewhat prevalent in the early part of the year, and diarrhœa in the summer. A system of sewerage is now being carried out in the district, but details as to ordinary sanitary work are lacking in the report. The death-rate was at the enormous figure of 23.96 per 1,000, though it is true that the deaths on which it is calculated are not numerous.

TAMWORTH.—The sanitary condition of this borough is evidently of the most unsatisfactory description. As regards excrement disposal, the Rochdale pail system was adopted in 1876, and there are now about 227 pails in use,

but the system has been 'so dreadfully abused' that it has not had a fair trial. Many midden cesspits still exist, and, although some further privy accommodation was provided during the year, much more is needed. The drainage is very unsatisfactory, many of the drains terminating in catchpits without outlets and in ditches. Moreover, several streets remain even now undrained. Referring to the water-supply, Dr. Fausset states that 'by far the greater number of wells must be in a dangerously polluted state'; but it is satisfactory to find that new waterworks are expected to be soon ready, which will provide a good and abundant supply. The town is also much subject to floods, which periodically render many houses damp and uninhabitable. Having regard to these numerous insanitary conditions, it is not surprising to find a high death-rate of 22.0 per 1,000 of the population. Of zymotic disorders, scarlet-fever was prevalent throughout the year, its spread being materially assisted by the absence of hospital accommodation. No less than 33 cases of typhoid fever occurred during the year, and more have occurred since its close. Many of the houses in which the disease occurred possessed large midden cesspits, and the fever was no doubt largely spread by the impure water-supply. Dr. Fausset's report, which is very full and complete, contains a catalogue of insanitary conditions that should set the Town Council seriously thinking about the necessary measures of improvement. This is the most important, since typhoid fever is prevalent in the town.

WATFORD.—For this district, Dr. Brett records a corrected death-rate of 18.3 per 1,000, though the method by which this result is arrived at is not very scientific. The general health is reported as good, diphtheria, mostly of a mild type, being about the district, and whooping-cough (partly in consequence of the cold weather) was very fatal. A total of 25 deaths from zymotic diseases was recorded, against 14 in the previous year. Dr. Brett thinks more ventilators to the sewers are wanted, as well as more land for irrigation purposes; and he urges the supply of water on the constant system, and the provision of a proper hospital for infectious cases.

WORCESTER.—Dr. Strange reports improvements in a variety of directions last year. In main and house-drainage, and in the internal ventilation of dwellings, considerable advance was made, and the systematic inspections, to which the Central Board attach such importance, were duly carried out. No epidemic of infectious disease occurred during the year. But Dr. Strange records the continued usefulness of the infectious hospital, with mortuary and *post mortem* room, which the Town Council have provided. Another important improvement to be noted is the practice of submitting all plans of new houses to the Medical Officer. Of the total deaths, 14 were from measles, 11 from fevers, 74 from diarrhœa and dysentery, 69 from consumption, 118 from other diseases of the lungs, 49 from heart disease, 26 from injuries, and 341 from other causes. The mortality amongst young infants is still excessive, no less than 112 deaths, out of a total of 727, occurring in children under 3 months, 52 were between the ages of 3 and 6 months, and 42 between 6 and 12 months. There must be some cause for this 'massacre of the innocents' beyond those mentioned by Dr. Strange.

BRIEF NOTES OF USEFUL CASES.

RECREATION GROUND.

1880. *A. G.* v. *Leeds, Mayor.* "Leeds Improvement Act, 1872", 35 and 36 Vict., c. xcvii, s. 35—Power to Corporation to close a Park and exclude the Public so many days in the year, not exceeding 10 in all—Park closed to the Public at large and let to a swimming club for a gala; but the Public admitted on payment of 6d. each—Held that the Corporation had not exceeded its statutory powers. (*Times*, May 12, 1880.)

RATES.

1880. *Darlington Union* v. *Chapman.* An Assessment Committee has no right of appeal against a decision of Justices at Special Sessions reducing a rateable value fixed by the Committee. (Q. Sess.) (44 J. P., 237.)

DEFAULT OF OWNERS.

1880. *Debenham* v. *Metrop. B. W.* Default in taking down dangerous party wall ordered by Magistrate to be taken down by owner—Whereupon wall removed by contractor employed by the Board for the purpose—Refusal by owner to reimburse Board, on ground that Board had incurred needless expense—Held that a Magistrate had no power to review the reasonableness of the outlay, but that on proof of the fact that it had been incurred he must order repayment. (50 L. J., M. C., 29; L. R., 6 Q.B.D., 112; 43 L. T., 596; 45 J. P., 190.)

RATING.

1880. *Eyton* v. *Mold Overseers.* "Rating Act, 1874," s. 4, subs. (a)—Woodlands rated at unimproved value, with 2s. per acre added in respect of sporting rights—Principle of assessment—Rate upheld. (50 L. J., M.C., 39; L. R., 6 Q.B.D., 13; 43 L. T., 472; 45 J. P., 54.)

RATING.

1880. *Great Eastern Railway Co.* v. *Trowse Guardians.* It is optional for appellants against a Rate to do more than appear *pro formâ* before an Assessment Committee if they intend to appeal to Sessions. (At Q. Sess.) (44 J. P., 156.)

RATES.

1880. *Midland Railway Co.* v. *Belper L. B.* "Public Health Act, 1875," s. 216—What are to be deemed "public works of sewerage"—Public drains used for subsoil water and not for sewerage held such "works", and therefore a Highway Rate quashed. (44 J. P., 735.)

RATES.

1880. *Mogg* v. *Yatton Overseers.* Owner of pasture land not being able to let the same generally, let the grazing for a certain time—Held that he was rateable for the land during the time the grazing was so let. (50 L. J., M. C., 17; L. R., 6 Q.B.D., 10; 45 J. P., 324.)

HIGHWAY.

1880. *Northumberland Whinstone Co.* v. *Alnwick H.B.* "Highways Act, 1878," s. 23—"Extraordinary traffic"—*Davies* v. *Williams* followed. (44 J. P., 360.)

HIGHWAYS.

1880. *Powers* v. *Bathurst.* Dedication—Presumption—Long user by the Public of a way across Copyhold Land is evidence of a dedication by both Lord and Copyholder—*Reg.* v. *Petrie* followed. (49 L. J., Ch. 294; 42 L. T., 123.)

PAVING EXPENSES.

1880. *Reg.* v. *Hutchins.* Summons for apportioned street paving expenses—Summons dismissed, on the ground that the street was a highway repairable by the public—Five years after, an additional outlay, an additional apportionment, and a second summons against the same party—Whereupon Justices made the order sought—Held that they were entitled to make the order, for the matter was not *res judicata*, so that the Highway character of the street in question might not again be considered. (50 L. J., M. C., 35; L. R., 5 Q. B. D. 353; 42 L. T., 766; 44 J. P., 521.)

ENCROACHMENTS ON HIGHWAYS.

1880. *Reg.* v. *Platts.* A Local Board has no power *mero motu* to authorise encroachments on a highway by a landowner, even to a very small extent, and with a view of improving the line of the road—Such powers can only be had by resort to the formalities of the "Highway Acts"—Indictment by a neighbour, who conceived himself prejudicial by Board's action—Verdict of guilty against encroaching landowner held good. (49 L. J., Q. B., 849; 43 L. T., 159; 44 J. P., 765.)

LIBRARY.

1879. *Smee* v. *Smee and Brighton Corporation.* Bequest in favour of a Free Public Library held void on the ground that Testator was of unsound mind when he made the will. (49 L. J., P.D.A., 8; L. R., 5 P. D., 84; 44 J. P., 220.)

ADULTERATION OF FOOD.

1880. *Smith* v. *Stace.* Adulterated butter purchased by Inspector's deputy, Inspector waiting outside—Held that

he proceedings were regular, and that it was not necessary or the Deputy to have taken the later steps. (44 J. P., 96.)

RATING OF MARKETS.

1880. *Spear* v. *Bodmin Union*. Stall in market held on annual tenancy—Holder not having the exclusive right to occupy any particular spot, held not rateable. (49 L. J., M. C., 69; 43 L. T., 127; 44 J. P., 764.)

HIGHWAYS.

1880. *Williams* v. *Davies*. "Highways Act, 1878," s. 23.—The question of what is "extraordinary" traffic is a question of fact—The decision of Justices that the cartage of an unusual quantity of heavy timber was "extraordinary traffic" for which the owner was liable, held good. (44 J. P., 347.)

LEGAL NOTES AND QUERIES.

THE ABATEMENT OF NUISANCES.

Would you kindly inform me who is the proper party to proceed against to abate a nuisance, the owner on whose property it exists or the owner of the property from whence it arises. I have several cases in my district where the drains from cottages empty into open ditches, belonging to different owners, and my Authority is of the opinion the party causing it is liable, but a magistrate informed me some time ago that the owner of the property where it existed was liable, and that it was for him to proceed against the person causing it, and not the sanitary authority.

A CONSTANT SUBSCRIBER.

[See the cases of *Reg.* v. *Trimble*, 36 L.T., 508; *Brown* v. *Bussell*, 37 L J., M.C. 65. Both cited in Chambers's *Public Health Digest*. From these cases it appears that the notice should be served on the actual author of the nuisance, as, in the instance put forward by our correspondent the author is known. But there would be probably a co-existent remedy against both parties under the circumstances. —ED.]

REVIEWS.

Health. By W. H. CORFIELD, M.A., M.D., F.R.C.P.. etc. Pp. 261. London: C. Kegan Paul and Co. 1880.

DR. CORFIELD'S skill as a lecturer is well known, and he has done wisely in publishing for general reading the admirable lectures, on the subject of health, which he has at various times delivered under the auspices of the Trades' Guild of Learning, and the National Health Society. The lectures do not pretend to any scientific interest or value: they are simply intended as popular expositions of great hygienic truths, and, as such, they admirably fulfil their purpose. The subjects are, it is true, conventionally treated, but Dr. Corfield manages to import some freshness, even to such well-worn themes as ventilation and the purity of water. Altogether, the book is an interesting and readable one, and may be read with profit by experienced sanitarians as well as by tyros on the subject. As a text-book for elementary courses on hygiene it would be very valuable, as its simplicity of style makes it readily comprehended even by beginners. In all, there are nineteen chapters in the book, these dealing respectively with general anatomy, the bones and muscles, the circulation of the blood, respiration, nutrition, the liver and the excretory organs, the nervous system, organs of the senses, the health of the individual, the air (including lighting, warming and ventilation), food and drinks, drinking-water, climate, houses and towns, small-pox, and communicable diseases. Thus it will be seen that the range of subjects is a wide one. Just enough is said about each to whet the appetite for more, which is a considerable literary merit.

Middle-Class House Architecture. By HENRY G. BRACE, F.R.I.B.A. London: 22, Chancery Lane.

THIS *brochure* is a reprint from 'The Artist's Journal of House Culture,' and contains some valuable hints on the mode of construction of houses inhabited by the lower middle-class. In many localities and suburban districts where these dwellings are most in vogue, there is often a total absence of architectural design, and although expense is one of the chief obstacles to ornamental display, much might be done to render the effect more pleasing than is the case with the majority of tenements of this class. The author gives an excellent account of the plan and design of some simple but effectively improved two-story villas built by him, and illustrating his very sensible views on this subject, and also upon the important subject of ventilation. Those who are concerned with the construction of middle-class dwellings will find interest and suggestive hints in its perusal.

Bovine Tuberculosis in Man: an Account of the Pathology of Suspected Cases. By CHARLES CREIGHTON, M.D., M.A. With Illustrations. Macmillan & Co. 1881.

THIS carefully prepared monograph is fortunate in the time of its appearance. The views of Niemeyer and his school on the pathology of phthisis are attracting general attention; whether tubercle is the result or cause of the inflammatory processes with which it is associated is being warmly discussed, and the communicability of animal diseases (especially tuberculosis) to man is recognised as a topic of first importance, and one urgently demanding investigation. We welcome the book, therefore, as most opportune, and predict for it a large circle of interested readers.

Dr. Creighton takes pains to assure us in his preface that the title of his work has been chosen for its brevity, and must not be held as indicating any intention to be dogmatic. The work is simply an account of the pathology of certain cases of a form of tuberculosis in man, which had the characters of an infection, and presented a likeness, in the morbid products, to bovine tuberculosis. Some apparently anomalous cases of tuberculosis coming under observation in the *post mortem* room, the affected parts were preserved for study, and on examination it was found that they resembled in many points the pearl-disease of the bovine species. Attention having been once drawn to the matter, parts from similar cases of human tuberculosis were submitted to examination, and again their likeness in form and structure to the morbid appearances characteristic of bovine tuberculosis was noticed. Thus, the possibility of the disease under observation having been conveyed to the subjects of it by the ingestion of meat or milk from tuberculous animals, or otherwise, was suggested, and the inquiry, particulars of which are now before us, was begun.

Though the author purports to trace the tuberculosis of twelve cases in man to infection or poisoning from the cow or ox, the evidence he relies on is the identity of the diseased product solely. What he

has attempted he has done well, and if the close morphological resemblance of one disease to another were sufficient to establish their identity Dr. Creighton's position would be a strong one. We feel sure, however, that while many will be willing to admit that the author has made good his proof, few will regard such proof as sufficient for the occasion. We say this without any desire to disparage the really important contribution to pathology before us. So lately as March 1880, Professor Virchow, in an address to the Berlin Medical Society, said, 'No man has ever yet acquired pearl nodules through partaking of tuberculous (perlsüchtig) flesh.' Dr. Creighton contends that the twelve cases he records show precisely those specific characters of which pearl nodules are the more familiar examples; and, as far as he knows, they are the only cases published which formally claim to be cases of specific bovine tuberculosis communicated to man.

The author's summary of the pathological anatomy of tuberculosis in the bovine species is derived from the best sources and is fairly complete. The chapter on the communicability of the disease to animals by experiment gives an account of Gerlach's research only, although the results of other, and, we think, more recent experiments, do not accord with his. A note of Orth's observations is introduced into another chapter. In any case, the fact that prolonged feeding with the milk of a tuberculous cow, or actual 'pearls', has occasionally sufficed to set up a somewhat allied disease in rabbits, calves, lambs, and goats, helps the evidence as to the communicability of pearl disease, but very little.

Dr. Creighton would claim no case of tuberculosis in man as a case of communicated bovine disease, unless he found on the serous membranes, or in the lymphatic glands or lungs, and occasionally in other organs, those evidences both of form and minute structure which are distinctive of the bovine disease as it exists primarily. He remarks, however, that cases of tubercular peritonitis, tubercular pericarditis, and tubercular pleurisy, appear to him to form one of the more likely groups of cases among which to look for evidences of infection from pearl disease. And, he adds, 'there is much likelihood that some at least of the many things called scrofulous are manifestations in the human body of the specific bovine virus.' Lastly, he gives reasons 'for thinking that bovine tuberculosis has sometimes appeared in man in the form of typhoid fever' (p. 102). On this subject our author has something to say to Medical Officers of Health. We quote the paragraph in full.

'I am not in a position to bring forward any original pathological evidence that cases of typhoid infection traced to milk are cases of bovine tuberculosis. Pathological records of such epidemics doubtless exist, although I have not been so successful as to find them. Medical Officers of Health, and medical inspectors of the central office, would add to their important services to the community if they were to relax somewhat the routine of their inquiries and the fixedness of their theories, and give some attention, on the one hand, to the question whether unusually bad cases of tuberculosis may not exist among the cows of the suspected dairy, and, on the other hand, to the question whether the bodies of those who die of the milk-typhoid, or of its sequelæ, do not show, even if it were only in occasional instances, those conditions of the serous membranes, of the lymphatic glands, and of the lungs and other viscera, which correspond, with certain allowances for the acuteness of the infection, to the morbid anatomy of the bovine disease. That cases of typhoid fever do occur, with nodular eruptions on the serous membranes, is sufficiently clear from the evidence that I have collected. Do such fatal cases of typhoid occur among the mortality of an epidemic due to milk?' (p. 95.)

The book is neatly got up and illustrated with many beautiful lithographs in colour and monochrome, representing the morbid appearances described in the text.

Substitutes for Alcohol in Fever. By FRANCIS VACHER. London: National Temperance Publication Depôt, 337, Strand.

IN a paper read before the British Medical Temperance Association on November 13, 1879, Mr. Vacher stated that he had treated successfully, at the Birkenhead Fever Hospital, 243 cases of 'fever' by means of ammonia, cinchona, and camphor, instead of alcohol. Mr. Vacher believes that the former 'certainly do the work required of them, and are less likely than alcohol to be followed by undesirable reaction, to interfere with secretions, and derange digestion'. This may be; but it would have been more satisfactory from a scientific point of view if Mr. Vacher had classified his fevers, given the mortality in each class, and the age and sex of the persons affected. Without these particulars the paper is of small value. Everybody knows that the majority of cases of typhus, enteric, and scarlet fevers are best treated by leaving them alone. The question of treatment has no real importance in regard of the hundreds who recover naturally, and any number of statistics of such cases treated by this, that, or the other drug prove nothing, except that the expense of the drug might have been saved. What one wants to know is the results of treatment in cases which are likely to die.

We do not believe in the stimulant treatment, nor in 'stimulants' at all; but of the value of alcohol in one form or another in particular stages of the various fevers, and, not the least, in children convalescing from scarlet fever, the evidence is overwhelming. This we regard as a fact, established, not by scientific experiment, or by the opinion of doctors, but by the common sense of ordinary people; it is probable the time is a good way off when camphor water will take the place of a glass of port or a tumbler of champagne.

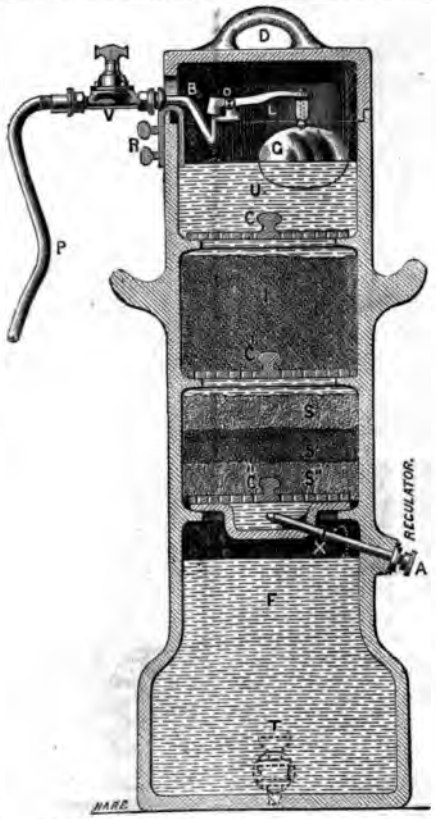
Typhoid Fever: Its Causes and Sources as Explained by the Germ Theory of Disease. By ALEXANDER R. BECKER, M.D. Cambridge, U.S.A. 1879.

The title of this pamphlet, reprinted from the *Boston Medical and Surgical Journal*, sufficiently explains its aim. It endeavours to account for the cause and progress of an attack of typhoid fever in the human subject by assuming that the contagia are parasites, which are propagated in their own appropriate nidus, and feed upon the body, appropriating its nitrogen and water. The idea is very well worked out, and the whole paper is eminently worthy of perusal.

Ask for MARGERISON'S Registered White Windsor OAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *azaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap. 9d. tablets.—(Advt.)

THE SANITARY RECORD
ILLUSTRATED GUIDE
TO SELECT EXHIBITS
AT THE
SANITARY AND MEDICAL EXHIBITION
AT SOUTH KENSINGTON.

The SPONGY IRON WATER PURIFYING COMPANY, Oxford St., will have a collection of 'Bischof's patent Spongy Iron Filters'. These filters are very generally known and justly esteemed, but we subjoin an engraving of one to be used with a ball-cock only, by which means the whole supply for



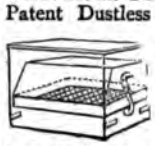
domestic use can be readily filtered. A pipe brought from the cistern or reservoir to where the filter is placed is all that is required to effect this object. The filter contains at its base the reservoir for filtered water (F), which is considerably larger than the reservoir of the ordinary domestic portable spongy iron filters of the corresponding size, thus insuring a larger supply of filtered water for immediate use. On the top of the reservoir will be noticed the regulator bowl into which tube (A) is cemented watertight. The latter is provided with a small lateral opening, which forms the only communication between the upper part of the filter and the reservoir for filtered water. The flow of water through the filter is thus completely controlled by the size of such opening. Above the regulator bowl are placed the filtering materials, namely, first prepared sand, and then spongy iron, resting on and separated by perforated bottoms. The prepared sand consists of three distinct layers, S, S' and S'', which must not be intermixed. The spongy iron (I) is covered by a perforated lid (C), which is tied down during transport to prevent the shifting of the filtering materials, and above which is the reservoir for unfiltered water (U). The filter is covered by cover (D). These filters are made in a variety of other patterns, both for home colonial use.

Messrs. QUIRCK, BARTON, & Co., Crown Lead Works, Normandy Wharf, Rotherhithe, and 61 Gracechurch Street, exhibit specimens of their Patent Tin-lined Lead-pipe, and Tin-covered Sheet Lead, an improved medium for the supply of pure water to dwellings, preventing lead-poisoning of water, beer, and other liquids. This piping is a combination pipe. It consists of a *distinct pipe of pure tin, protected by an outside covering of lead*, the two pipes being so united at their surfaces of contact as to be inseparable by any contortion to which the pipe may be subjected. In pliability it does not differ in any appreciable extent from lead-pipe, as it is easily bent to any desired form or angle, without affecting the interior tin-pipe, which comports itself physically as a part of the body of the lead pipe, but yet remains distinct in its metallic and chemical properties. The annexed sketch represents a section of the pipe, and will convey an idea of its form. The inner circle, marked TIN, represents the internal pipe of pure tin, and the outer circle shows the external casing of lead. It will be clearly observed that this is a tin pipe, so formed in conjunction with lead, as to combine the qualities of ductility and pliability of that metal, with the innocuous nature and superior tenacity of the tin. The superior strength which this piping derives from the tenacity of the tin, as well as from other conditions which operate in the process of manufacture, serves to reduce the cost of its employment as a substitute for the ordinary lead pipe, as experience has proved that *this piping, half the weight per yard of lead pipe, will sustain the same internal pressure.* The Patent Tin-lined Sheet Lead is intended for use in lining Water-Cisterns, Baths, etc., or for storing liquids, for which lead is now used. Its advantages for this purpose are equally as great as that of tin-lined lead-piping, for the prevention of lead-poisoning. The sheets are not plated or coated with tin by dipping in a bath of tin, but are made of a distinct sheet of tin covering one side of the sheet lead, and so united together in the manufacture that the two metals cannot be separated. The merits of this Sheet Metal for the purposes before mentioned, are apparent, and its superiority is manifest to any one understanding the nature of lead, and the danger that may arise from its use. Slate cisterns are subject to breakage from frost. This risk is entirely obviated by the use of this metal. It has also the advantage of great durability, as well as of cheapness, to recommend it. The sheets can be supplied tin-lined on both sides if required. Several interesting experiments have been made with the tin-lined pipe, as to its comparative extension under bursting pressure, as compared with common lead-pipe, and those conducted by Mr. Kirkaldy of London, showed an average per cent. of 13.5, of tin-lined pipe, as against 9.4 of ordinary lead-pipe. From these results and many others, it has been proved that the patent pipe of the same diameter, while considerably less in weight, bears a greater strain than the lead-pipe, and notwithstanding its great advantages from a sanitary point, can be supplied at about the same cost.

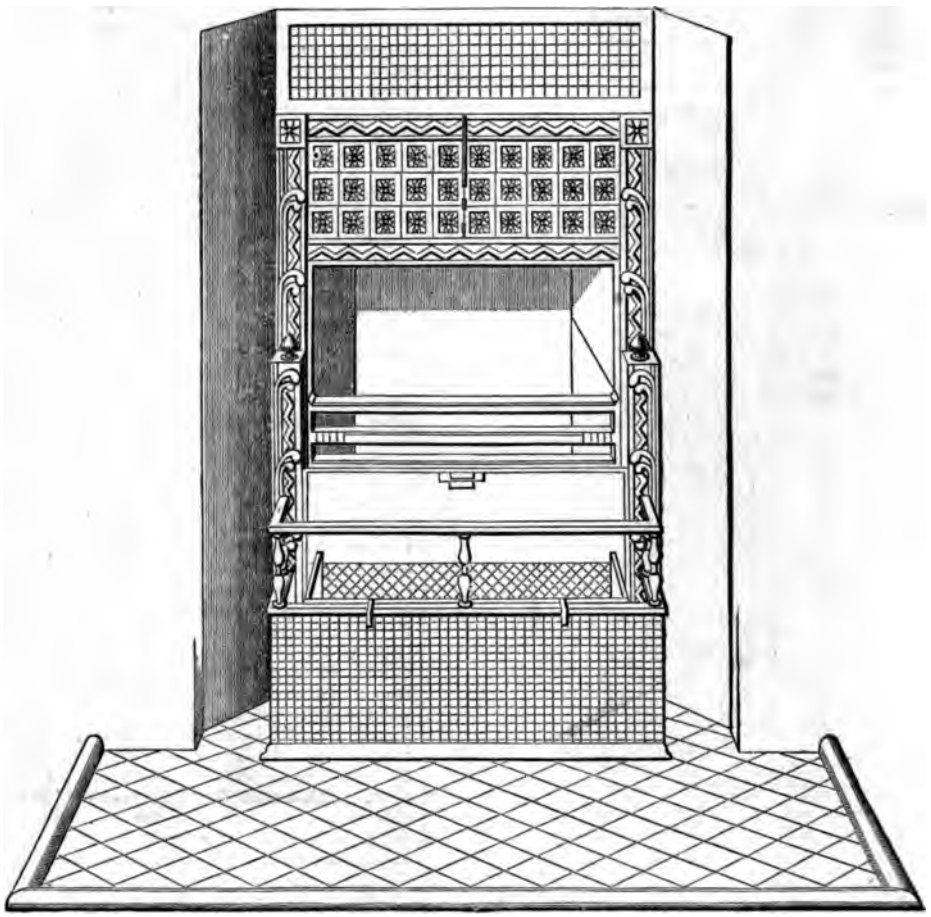
SECTION OF

TIN-LINED LEAD PIPE.

Mr. M. A. SHAW, Leighton Buzzard, Beds, exhibits his Patent Dustless Cinder Sifter, of which we append an engraving. The object of the invention is to enable cinders to be sifted in each room as the housemaid is laying the fires, and being enclosed in a wood case, with lid at top, no dust accrues in the process of sifting. A galvanised iron slide at bottom is to be drawn out when the bottom part of the case requires to be emptied of the ashes. It is simple in construction, and appears to be perfectly effective.



MR. EDWARDS, Great Marlborough Street, exhibits his new Smoke Consuming Slow Combustion Grate, of which we append an illustration, showing front elevation with open grating at top for admission of fresh warm air. Mr. Edwards has taken up the question of preventing smoke as it was left by the late Dr. Neil Arnott, and he has introduced a grate which he maintains is free from all the objections made to previous smoke-consuming grates, and possesses the merits of being effectually smoke preventing, inexpensive, and simple. Mr. Edwards adopts the principle of putting a body of coals sufficient for a day or a night's consumption into a fire-basket or chamber, making a fire on the top of the body of coals and allowing the fire



to burn gradually downwards till the whole is consumed. This principle is substantially the same as that adopted in Dr. Arnott's grate, and in the modification known as the *Builder* fire. It also resembles, in some particulars, a grate patented by Mr. Goodchild, an architect of Guildford, in 1857, but it embodies substantial improvements on each method. Instead of machinery to lift the basket of coals as it burns down Mr. Edwards uses what may be called a blind to move down by degrees in front of the body of burning fuel. Mr. Edwards dispenses with a sunk ashpit altogether. He balances his blind in front of the body of fuel by chains and weights, and so arranges them that they can be got at readily in case of anything being wrong, without any necessity for pulling out the grate. He provides a wire basket in front of the grate, which catches all the coal that falls, and allows the dust to fall through it into a trough out of sight, the cinders to be used for next day's consumption. For regulating chimney draught Mr. Edwards dispenses with the common register-door, which cannot be got at except by putting the hand up a hot and dirty chimney, and provides a door with a chain in front of the grate, which may be handled and used without the slightest inconvenience. In front of the wire cinder basket a fender guard is provided, just sufficient to protect the person from fire, and to make a pretty covering to the basket, the ordinary fender being dispensed with altogether. Outside the fender guard a tile or marble hearth may be provided. At the top of the grate a plate of iron is made movable, so that the setting of the grate may be easily accomplished, and the machinery of the register may be got at in a few minutes, if necessary. In connection with his system, but not as a part of his patent, Mr. Edwards seeks to introduce the plan, well known to students of sanitary science, of admitting fresh air, entering from an external wall, passing along a channel of suitable dimensions, generally below the floor, becoming warm by contact with the back parts of the grate, and entering the chamber at a temperature of from 90 to 120 degrees, instead of entering the room at from 30 to 50 degrees, by cold air channels or by doors and windows, as at present, occasioning draughts of cold air.

MESSRS. JOHN WARNER & SONS, Crescent Foundry, Cripplegate, E.C., exhibit a variety of their specialities, from which we make a few selections for illustration. Their patent special valve-closet, which has obtained the name of a thoroughly good water-closet, is worthy of attention. It is fitted with improved basins, and Bower's Patent Overflow Sewer Gas-trap combined, and Patent Supply Valve with copper case pneumatic regulator. By the arrangement in the basin splashing is avoided, and a quick discharge is obtained. The overflow (when once charged) is thoroughly sealed against sewer gas. The main valve is so placed as to give a full way and to pre-

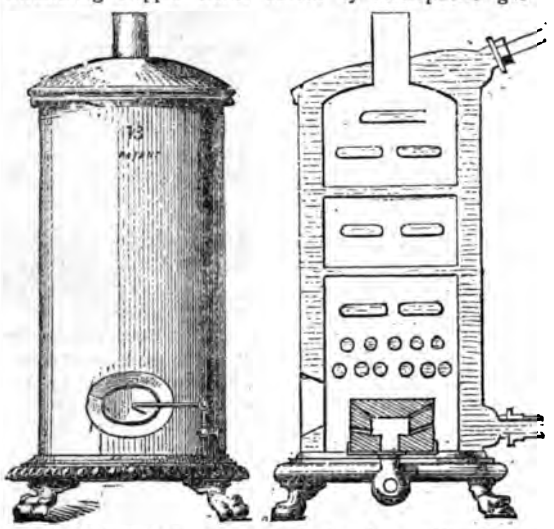
t choking, and it cannot be overdrawn or become foul. : Regulator is simple and thoroughly efficient, and action is comparatively noiseless. Their Improved Closet has gained considerable popularity, and ongst other places twenty-four of them are in use in

's Hospital, where, in connection with Banner's sys- of ventilation of drains and soil pipes, they are giving t satisfaction. Another exhibit is the Crescent Water

et, for asylums, hospitals, factories, railway-stations, ols, colleges, &c., an article which meets the imme- requirements of Water Companies and other persons, eby a perfect flush may be given to closets without a e of water. This apparatus is fitted so that the con- of the cistern may be discharged by pulling a chain ire, or with a simple arrangement in connection with eat, forms a most perfect self-acting closet. Its parts so strong and simple in their construction that no ngement can take place. Their portable Water Closet Commode appeals particularly to the medical profes-

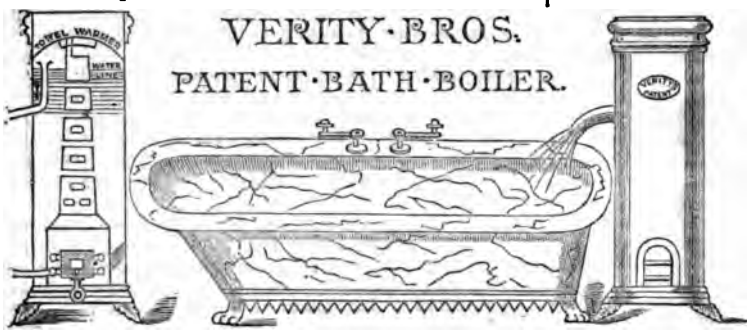
For sick rooms, colonial dwellings, and other places e a constant water supply and good system of drainage are not established, it will be found invaluable. The pan is made with a self-acting valve, and the basin is fitted to drop into a water groove, so that, when the pump handle is raised, sufficient water passes to cleanse the basin and to form an air-tight joint to the valve, so that there is no *escape of effluvia* from any part of the apparatus. The pail and basin are provided with a lid and handle like the ordinary slop-pail, in order to remove them when necessary. The cistern is made to contain sufficient water for several evacuations, and is complete and compact in every respect. A variety of other useful appliances will be found in this collection.

Messrs. VERITY BROS., 1, Stanhope Street, Euston Road, N.W., exhibit Patent Gas Fires, adapted for use in ordinary fire-places. They consist of a burner made in fireclay, which, being on the atmospheric principle, produces neither smoke, smell, or dust, while it gives out great heat; this is fitted in the grate and concealed from view, by a packing of indestructible fuel. The appearance is that of a coal fire, whether or not in use, without the trouble of constantly cleaning and replenishing. They are as simply managed as an ordinary gas jet, and may be immediately turned out when not required. Over 30,000 of these gas fires are now in use in all parts. Burners on the same principle can be applied to cookery stoves and hot plates, the desideratum being that they are non-corrosive, and retain heat in themselves, so that one of these cooking burners is equal to three of the ordinary kind.—Patent Circulating Copper Boiler heated by atmospheric gas-

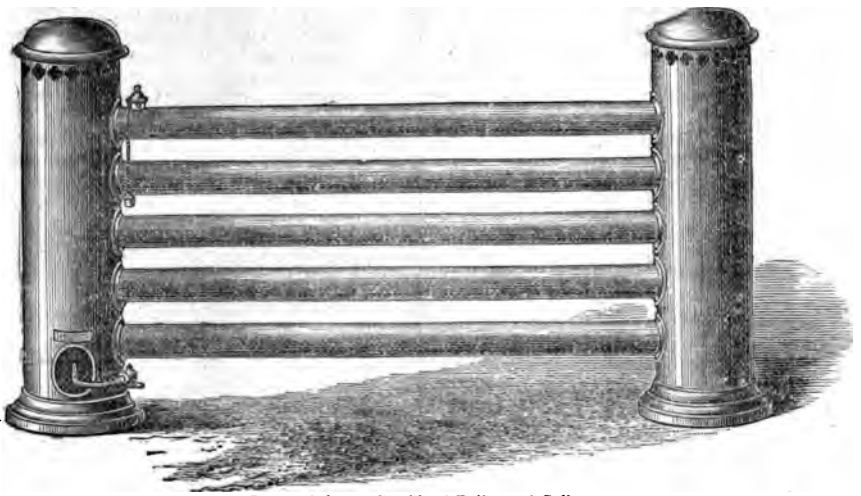


burner. These boilers are made in five sizes:—The No. 1 driving 60 ft. of two-inch pipe; No. 2, 85 ft.; No. 2A, 120 ft.; No. 3, 200 ft.; and No. 4, 300 ft. They are very certain and effective in action, and for hot-water apparatus up to the power named, are all that can be desired. They do not require any attention, and as with all gas apparatus, may be regulated at the burner to give the heat required. They are well adapted for heating pipes or coils in halls, billiard and other rooms, conservatories, etc.—Patent Bath Boiler, to stand at the side of bath, so that water may be heated and drawn off into bath, or for domestic purposes. With this boiler, a charge of hot water sufficient to heat a bath up to 95° can be obtained under twenty minutes. It is very simple in construction, and cannot get out of order. The boiler when once charged remains full, and consequently is not liable to derangement as with the generality of gas boilers, by carelessly lighting the gas before turning on the water. No fixing is required further than to attach the gas and water-supplies.—Patent Osborne Combined Boiler and Coil (as supplied for Her Majesty's marine residence at the Isle of Wight). For warming halls, conservatories, offices, billiard-rooms, organ chambers, drying rooms, etc. They are made in various sizes to meet re-

quirements, and the metal used is copper and brass finished off and lacquered, the colour of the metal giving an

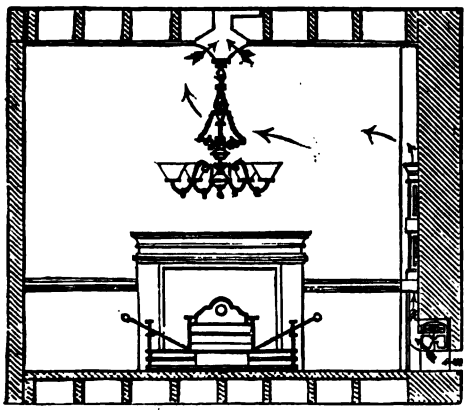


effective appearance. The inner construction consists of a tubular boiler, formed in one of the pillar ends of coil. This is heated by three fish-tailed burners. There is air is heated by passing over metal or fire-clay plates, which, being in direct contact with the fire, soon become red-hot and so burn the air; it will be seen in this invention it is impossible for this to take place, as *the whole of the heating surface is surrounded with water*. The stove consists of a spiral coil enclosed in a cylinder filled with water, a slow combustion furnace passing up through centre of coil to heat the water, and the cylinder is surrounded with an outer case, so that no heat may be lost. The Patent Air Propeller, driven by two fine pin-hole jets of water, draws the air through the apparatus and drives it in the required direction. The water, after leaving air propeller, is made to pass over fresh air inlet in the form of a fine spray; the air passing through the spray is cleansed from all impurities, and, passing round hot-water cylinder, enters coil at bottom



Patent Osborne Combined Boiler and Coil.

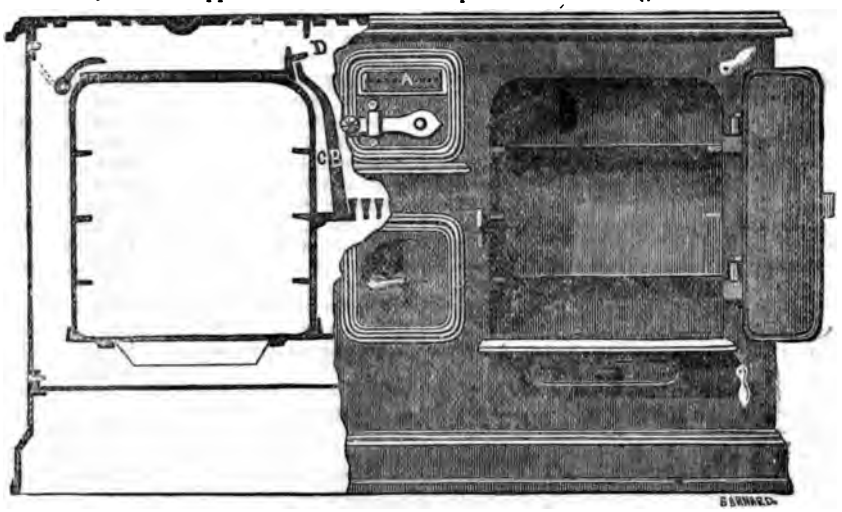
neither smell nor vapour given off, as the products of combustion pass through the boiler, and are taken up by the steam formed in a chamber at the top of pillar; from this chamber a pipe is conducted back again through the boiler, so whatever moisture is generated, becomes superheated before its discharge. The apparatus is very efficient, compact, and portable, which is a great desideratum. It does not require any fixing, as the gas-supply may be attached by means of a flexible tube. These coils may be further ornamented with Repoussée panels if desired.—Patent Warm



Air and Ventilating Apparatus, for producing a continuous current of *pure warm air*. In most warm-air stoves, the and becomes heated as it is drawn through; it may be delivered dry, moist, disinfected, or otherwise. The heat may be regulated to the greatest nicety by opening or closing valve, and these apparatus are made in sizes to deliver from 50 to 600 cubic feet of air per minute, heated up to 200 degrees.—Patent Ventilator or Air Propeller, for introducing fresh air into dwellings, etc., and extracting the vitiated air therefrom. This machine has only one movement, and is very simple in action; numbers of them have been in use continuously for many years without attention. It is driven by a power always at command, inexpensive, and under most perfect control, and not demanding technical knowledge of the most simple description on the part of the attendant—we refer to water, the moving power employed. A cistern placed in the highest available position in the building in which the apparatus is to be used, and a ⅜-inch lead pipe conveying the water to the machine, is all that is required. The internal mechanism consists of a drum, with a set of fans worked by a fly-wheel placed on the same axis as fans, which revolves in jewelled centres. The two pin-hole jets of water directed on to fly-wheel, put these fans in rapid motion. The machines are made in five sizes, the average rate of air passing through them being 1,000 lineal feet per minute, or, taking the two extreme sizes, the cubical output per minute may be computed at from 60 feet with a No. 1 size to 650 feet with a No. 5 size. This is with 40 lbs. pressure, but the machine can be worked effectively as low as 18 lbs. The apparatus is perfectly under control by turning down the supply-valve so that the current of air may be regulated to the nicest degree. The fresh air is conveyed from machine into apartment, by a vertical tube fitted against the wall, or any

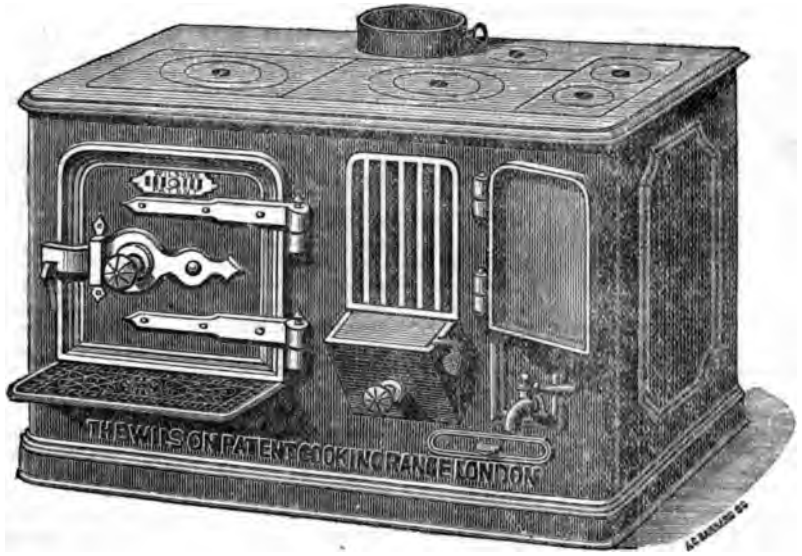
r convenient position in the room; the discharge outlet ig about 5 ft. 6 in. from floor-line, AND PERFECTLY E FROM DRAUGHT. The mouthpiece of air-shaft is d with a regulator, by which the current may be cted at any desired angle, and provision is made for ing a moistened sponge in the tube through which the ming air is forced, cleansing it from all dust, fog, etc. is expedient that the sponge be removed and cleansed a day, but this can only occupy a few moments.) A mber is provided for ice to cool the air in summer, and ox can also be added for the introduction of disinfectants edicinal substances.

HE WILSON ENGINEERING COMPANY, 247, High born, show several of their now popular Kitcheners Cooking Ranges, in which the consumption of smoke lmost entirely carried out. We have on a previous sion given a description of the Wilson invention in SANITARY RECORD, and now append a half-sectional



ition, showing the principle of the range. An air- regulates the fire, so that almost all the heat en- ered is employed in the range, and but little passes up himney, thus rendering a fire in the latter almost, if entirely, an impossibility. The combustion of the ce and the noxious gases is ingeniously effected by as of intensely super-heated air. The cold air, in the place, being admitted through a ventilator A in the fire door, is made to travel through flanged chambers, of which the fire-box B itself forms in every case one side; in this passage it is thoroughly heated, and meets the smoke and gases as they leave the fire-box, where the progress of the latter is somewhat arrested by means of a plate called a 'baffle' plate D. At this point the heated air and smoke, &c., mingles, producing almost perfect combustion before travelling round the flues surrounding the ovens and boilers. The range is therefore practically a smoke-consuming one, while but very little soot comparatively accumulates in the flues. To accommodate those persons who prefer to see an open fire in their ranges, the Company have recently introduced one embodying that feature, while retaining all the other advantages of their invention, as shown in the accompanying drawing. Another stove on a much larger scale has just been completed with high-pressure steaming-boiler, adapted for hotels, club houses, and the largest requirements in cooking.

Mr. F. DYER, High Street, Camden Town, is present illustrating his system of heating by hot water, which has been explained in detail in the SANITARY RECORD for February 15, 1881.



LEONI and Co., Limited, St. Paul's Street, New North Road, exhibit several of their Gas Family Cookers, a drawing of which we append. Mr. Leoni's productions in gas apparatus are too well known to need much comment here.

We may remark, however, that some important improvements have recently been made in them. Independent of the inside lining of thick fire-clay tiles, made and kilned on their premises, with which all these cookers have always

been provided, they are now being made with an outer casing filled with a non-conducting material which prevents the escape of heat; the outside metal walls are of galvanized iron to prevent rust. Two supply pipes of different diameter are now attached for the supply of gas. The larger one is intended to be used on first lighting, to get up the heat quickly. This can then be turned off, and the smaller one used for the remainder of the time. These cookers are remarkably strong and well made, and are admirably adapted for the requirements of a family. They are made in several sizes, to suit the number of inmates of a house, the larger ones containing additional advantages. Mr. Leoni also exhibits some new heating gas stoves of peculiar and novel construction. Amongst these will be found examples in which a combination of fire-clay and asbestos produce a most cheerful and pretty appearance, and the consumption of gas is very small, while the heat given off is very great. Another exhibit of considerable interest is a new patent gas boiler, for heating water for baths or general domestic purposes, by which about thirty gallons of water may be heated to 120 degrees Fahrenheit in twenty minutes, starting at a temperature of about 50 degrees.

Mr. Wm. Hellier, Duke Street, Grosvenor Square, whose name is well known in connection with one of the best instantaneous water-heaters of the day, which we fully described in the Sanitary Record for May 15, 1881, exhibits several examples of his Heater, and arrangements for Heating Buildings and Conservatories by its means, while retaining the advantage of having a supply of hot water at command for domestic purposes.

Messrs. Portway and Son, Halstead, Essex, are present with a collection of their popular 'Tortoise' slow combustion stoves, which have been fully described by us in the Sanitary Record for February 15, 1881. These stoves are made in a variety of sizes, to be suitable for either the smallest apartment or for churches or public buildings. They are a strong, neat, and inexpensive stove; they will burn coke, cinders, or almost any refuse, and recent trials prove them to be admirably adapted for anthracite coal, making them entirely smokeless. They are lined entirely with Stourbridge tiles, which are really the only wearing parts, and these can be inserted when new ones are required without disturbing the stove. They are in consequence most simple in construction, and by a peculiar flue arrangement, should coke or bituminous coal be used, all sulphur fumes are carried off, rendering them perfectly safe and reliable for heating conservatories, etc. The cost of fuel is very small, and they will burn for many hours without the slightest attention. Medical testimony, in the possession of the makers, says they may be used in a bed-room without objection by persons suffering from asthma. The newest form in which these stoves have been introduced by Messrs. Portway, is as boiler stoves for heating coils, etc. We append an illustration of this form.

The boiler is so placed as to be exposed to the heat of the fire so long as any fuel remains. It has been practically

tested and found to answer admirably. These stoves will be found especially useful in heating halls, whilst the adjoining apartments or conservatory can have a high temperature maintained by means of hot-water pipes connected with the boiler, without any additional cost for fuel or trouble in management. These advantages, in addition to the well-known power for burning long hours possessed by these stoves, prove them to be at once the best and most economical heating appliance extant.

Messrs. J. L. Bacon and Co., Upper Gloucester Place, W., exhibit a collection of Hot-Water Apparatus, and Mr. J. Constantine, Oxford Street, Manchester, shows a new Convoluted Stove.

The Sun-light Cooking Stove Company of Manchester, exhibit their cooking stoves bearing this name, and which we described on a former occasion. They are of the 'independent' class, requiring no setting, and may be placed in any part of the kitchen to suit the convenience of the user. They are compact, quick, and reliable in action, and for their small size capable of doing a great amount of work. Special utensils, economising space, and performing two or three operations in one (in the case of one of them), are provided, and the apparatus as a whole is a complete *multum in parvo*. By a recent arrangement a coil of water-pipe fixed on the top of the fire in connection with a cylinder, that may be fixed in any part of a house, secures the usual supply of hot-water for baths, etc., and as the boiler is dispensed with, prevents the accidents that often attend their use.

Koumiss.—Under this title the Aylesbury Dairy Co., Limited, exhibits the well known preparation of milk to which this name has long been given. Koumiss has long been known to the medical profession, especially abroad, as a form of milk in which the albumen and casein are partially digested by the natural process of fermentation, while an abundance of carbonic acid is generated, which makes it sedative to the irritable stomach. There has hitherto been a considerable difficulty in obtaining Koumiss under such circumstances as should make it easily available at a low cost, and delivered from day to day free of charge at the house of the consumer. The Aylesbury Dairy Co. have advantages for this purpose, inasmuch as besides possessing an almost unlimited supply of pure milk, obtained from herds of which the sanitary condition is thoroughly superintended, they have also specially erected premises, covering a considerable extent of ground, and including every appliance for the reception, storage, cooling, and protection of milk, and have the necessary facilities for daily deliveries in all parts of London. For the manufacture of Koumiss they have the advantage of the continuous daily service of Dr. Vieth, of Schleswig-Holstein, a chemist who, before coming to this country to enter the service of the Aylesbury Dairy Co., had received a thorough training in the Laboratory of Bunsen, and on the Experimental Dairy Farm of the Schleswig-Holstein Government, and for whose use they have erected extensive and beautifully fitted laboratories. The first step which the Aylesbury Dairy Co. have taken has been to reduce the price at which Koumiss is

sold to one-half, and to deliver it daily free at the houses of the customer or patient. By the aid of their appliances, and their extensive laboratory, they are able also to secure the greatest care in the working of the Koumiss, and remarkable uniformity in quality. The quality of Koumiss differs of course, it is well known, according to the stage of fermentation. Fresh Koumiss is particularly rich and delicious as a daily beverage, highly nutritious and digestible, and forms a drink in which the most fastidious palate delights, while the system easily assimilates it. It has in a considerable number of cases formed the sole diet of persons in acute disease, convalescence, and chronic conditions of delicate health, whose stomach rejected every other kind of food. Koumiss of a later date, that is to say, Koumiss which has been kept from four to ten days, naturally loses its sweetness; a greater portion of lactic acid is developed, and the drink becomes one somewhat different in flavour, more decidedly diuretic in its effects, and of a more distinctly medicinal quality. The medical man who orders Koumiss, when he requires Koumiss of advanced state, can state of how many days old he wishes it, and this requirement also can always be complied with. For the public generally, as an ordinary beverage, fresh Koumiss is a table luxury which has much to recommend it, and which is probably destined to considerable popularity, as it is both delicate in flavour, has the advantage of a refreshing creamy effervescence, and is in a high degree digestible, while it has unrivalled powers of nutrition.

FOREIGN SANITARY SECTION.

In this section we are only, at the moment of going to press, enabled to give the names of the exhibitors and the articles they exhibit. Should any articles be sent which call for detailed comment, we shall remark upon them in the August number of the SANITARY RECORD.

Plans for public buildings will be shown by M. BORDIAN, Rue Joseph II, Brussels. A full-sized model of a system of drainage, with water-closets, sinks, baths, and gullies, fixed in position and working, and some screw-joint drain pipes, are sent by Mr. C. W. DURHAM, Michigan Avenue, Chicago, U.S.A., as well as a variety of House Drainage Appliances in use in America; plans of the Roman Baths at Vienna are shown by Dr. VON HEINRICH, Römisches Bad, Vienna.

FREDERICK SIEMENS, Fabrik Strasse, Dresden, will show a model of Crematory Apparatus; photographs and plans of the Sanatorium Modum, and Landieford will be shown by Dr. THAULOW, Modums, Kuranstatt, Norway; and plans of the Baths Rancegno, are sent by Drs. WAIZ BROTHERS, Connans, Austrian Tyrol.

WILLIAM BENGER & SONS, Sophien Strasse, Stuttgart, send a useful assortment of woollen underclothing.

LÉON LORNZÉR, Rue Royale, Brussels, exhibits several Lamps for Mines, Hygienic Apparatus for Mines, Designs for Life Boats, and several Diagrams.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

SANITARY ASSURANCE.

Your correspondent C.W.A. writes a long letter to prove that the Sanitary Assurance and Protection Associations which have been established in Edinburgh, Wolverhampton, London, and elsewhere, do not contain a 'conceivable potentiality of practical success.' It is rather too late to discusss the 'conceivable potentiality' now, as the Edinburgh Association has been highly successful for the last three years, as your correspondent may easily see for himself, if he procures and reads their reports and balance-sheets which are printed yearly. The association in London which has the lowest scale of fees, charges double what the Edinburgh Association does, on account of the much greater distances and greater expenses of all sorts in London, and your correspondent will doubtless be glad to hear that it is highly successful also, and that its officers have no fear of starvation.

Its engineer finds no difficulty in inspecting two houses per day, and two houses per day at two guineas each, taking 300 working days in the year, gives 1,200 guineas a year. As the distinguished members of council whose names your correspondent quotes, give their services gratuitously, the whole of this sum is available for the payment of the officers who do the work, and who have certainly no reason to fear starvation.

COSMO INNES, *Secretary*.
London Sanitary Protection Association.

Your anonymous correspondent, C. W. A., who appears to run a muck against Sanitary Assurance of whatever form or kind, should at least be careful of the accuracy of his statements; he appears to have muddled up the allurements of Associations with those of individuals, and might have better arranged his matter and his ideas, interpolating as he does the latter between the former. As the latter (individual Sanitary Assurance) more especially interests myself, met, as he confesses, 'in a very simple and straightforward fashion', I wish to observe that he has misconstrued or misunderstood the suggestion, in which setting forth the objection to the paraphernalia of 'directors, bankers, solicitors, etc., etc., etc.', I advert to the advantage to be derived from the advice of one specially qualified to direct and intelligently supervise, so that the work in connection with the proper sanitary arrangements of our dwellings should be sound in principle as well as in execution. 'The whole affair', he states, 'is to be the work of an enterprising plumber'; entirely ignoring the fact that an enterprising late Medical Officer of Health to a large Combined Sanitary Authority, and who is certified in Sanitary Science by the University of Cambridge, directs the enterprising plumber, specially trained in a very good school for this kind of work, moreover, without any interest in those numerous patented inventions foisted on a too credulous and ignorant public. C. W. A. gives his far from convincing reasons for 'gravely doubting whether not only they, but any other plan of a similar kind, can possibly issue in anything but injury to the cause they profess to promote', and in his lengthy communication he does not considerately offer to put us benightened individuals in the right groove. It is a pity so shining a sanitary authority should hide his light under the bushel of the anonymous; he might at least give us the weight of his illustrious name to accelerate the wheels of sanitary progress, too heavily skidded by trade interests. Possibly, however, C. W. A. may after all be one (to use his own words) interested in 'patented appliances for the complication of drains and the intensification of stenches he may eventually prove to have an interest in recommending to the confiding members of his "Association" into whose premises he may once have succeeded in making good his *anonymous* way'. Woe unto you, Sanitary Obstructionists, 'ye entered not in yourselves, and them that were entering in ye hindered'.

P. HINCKES BIRD, F.R.C.S., F.L.S.
1, Norfolk Square, Hyde Park, W.,
June 24th, 1881.

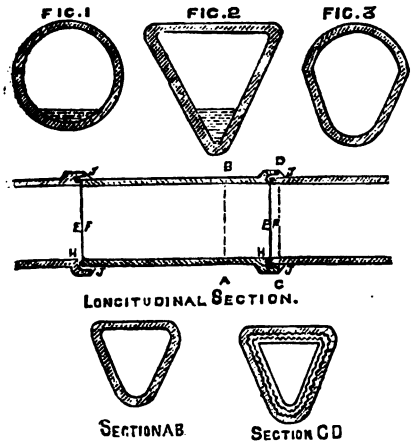
THE FOOD OF MAN.

On the 22nd inst., I addressed a circular letter to sixty Medical Officers of Health principally of combined districts, asking the question:—'Do you consider a cow fit for food of man which has been slaughtered on account of milk in puerperal fever?' This was done on account of certain members of the Haslingden Local Board having questioned my opinion (affirmative) on the subject. Will you kindly allow me to thank, through your columns, those thirty-seven gentlemen who have up to this time answered my letter.

J. A. HARRISON, M.D.,
Medical Officer of Health to the Haslingden Local Board.

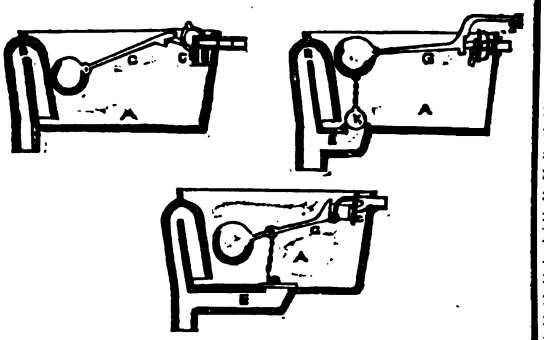
ILLUSTRATED SANITARY PATENTS.

4054. (1880.) DRAIN PIPES. T. H. BAKER, LONDON. [4d.]—The object of the invention is to avoid the defects of ordinary drains, and the want of self-cleansing power, &c. The illustrations show earthenware pipes of a certain size, but it is intended to apply the invention to drains of various sizes and materials. The new drain, Fig. 4, 5, and 6, combines the advantages of small drains with those of greater capacity, viz. by the adoption of small radii for the bottom of the drain, which confining the sewage (transversely) within the compass of a small drain causes it to rise to such a height from the bottom of the drain that it is twice or more than twice as deep as the same quantity of sewage in a circular or egg-shaped drain of similar capacity. This is illustrated by Figs. 1, 2, and 3, which show the respective depths of an equal quantity of water in circular, Fig. 1, improved pipe, Fig. 2, and egg



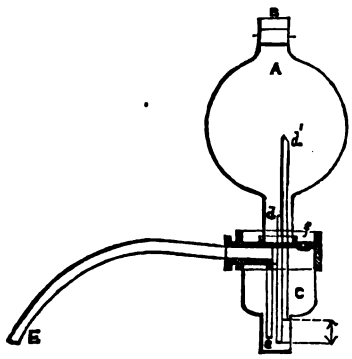
shaped, Fig. 3, all being of the capacity of a 9 inch circular drain, the gradients in each case being equal. This greater depth represents an increased velocity of sewage or self-cleansing power of 5 times when the flush is small, but increasing to 10 times when the flush half fills the drain in favour of the new drain, see Figs. 2, 4, 5, and 6. Thus a flush, which in the circular or egg-shaped drain, would meander slowly to the sewer, would in the improved pipe form to such a depth, and move with such velocity as to carry all matter to the sewer. The section of the new drain is founded on an equilateral triangle (but is capable of variation), the corners being rounded off by internal radii of 1¼ inches or thereabouts. Any of these rounded corners form the bottom of the drain, which should not be laid on one of the flat sides.

4411. (1880.) CISTERNS OR FLUSHING APPARATUS FOR WATER-CLOSETS. V. BROMLEY, G. CROWE, AND W. JAMES. CHESTER. [6d.]—This invention relates to improvements in cisterns, &c., for flushing water-closets, urinals, and the like, and the cisterns can be made self-acting, or actuated by means of chain, handle, and lever, and by other arrangements. First. As shown in Fig. 1 self-acting or regulated to allow a discharge of the water at stated intervals. To the cistern A a syphon B is cast or fixed, and by means of an adjustable cock C, which can be regulated to admit sufficient water to fill the syphon, and flush at any fixed interval of time, the periodical flushing is effected. The water rising to the top of the syphon B fills it, and the entire contents of the cistern down to the bottom of the syphon are at once discharged and an efficient cleansing effected. The cock C is closed or nearly so when the cistern is empty, and water is supplied by the small subsidiary tap H which is constantly open, and as the ball rises the cock C opens gradually, until when at the top there is a sufficient flow of water to fill the syphon B and cause the discharge to take place. Second. In addition to the cistern described above is employed a lever D (as seen in Fig. 3) to which may be connected a chain and handle or other suitable device for opening the ball-cock C when desired to cause a flushing, thus making



the cistern self-acting and also controllable by hand should occasion require. Third. To the cistern A and syphon B is an arrangement of lever D, chain, and handle, as used in the second case. These act on the ball cock C, which is adjustable so as to allow the water to rise nearly to the top of the cistern A and syphon B. When it is required to flush, or that the cistern should be discharged, the handle is pulled, the water then enters and causes the syphon to overflow and the flushing is effected. Fourth. They construct these cisterns with a small pipe E leading from the cistern bottom, as shown in Figs. 3 and 4, or from the inlet pipe that supplies the cistern into the outlet pipe. By raising a valve K in the bottom of the cistern or by turning a cock, preferably a push-cock, in the small pipe leading from the inlet, a momentary discharge into the discharge-pipe takes place, causing a partial vacuum which fills the syphon, and thus causes a general discharge. The valve K in the bottom of the cistern is usually operated by a chain attached to the ball float lever G; as this lever is raised a certain height by hand or automatically, the valve K is lifted from its seat and the discharge takes place.

4509. (1880.) SUPPLY OF DISINFECTANTS TO WATER CLOSETS. E. WALNER, STOWMARKET. [6d.]—This is a novel and simple apparatus for automatically supplying a given quantity of a disinfectant to water-closets and urinals. The operation of the apparatus is as follows:—The reservoir A being supplied with a disinfecting fluid and closed air tight, a certain quantity of the fluid will pass through one or both of the tubes d, d^1, herein described, into the cistern C till the lower ends of both these tubes are covered, thus preventing the admission of air into the reservoir A.



On operating the handle of the water closet, or otherwise causing the water to flow down the supply-pipe for flushing the same, a certain quantity of water will, owing to the resistance offered to the discharge of the flushing water by the spreader of the closet, pass through the syphon E, e, into the cistern C, and will dilute the disinfecting fluid therein, and on the cistern C becoming full or nearly so the

water will close the valve *f*, and prevent a further influx of water, however long the supply-pipe may be kept open, thus avoiding an overflow. On the flow of water ceasing, and as soon as the level of the water in the supply-pipe falls below the connection with the end of syphon E, the diluted disinfectant will pass from the lower cistern C through the syphon E into the basin of the water-closet; on the cistern C being emptied, or partly so, by the action of the syphon, a fresh supply of disinfecting fluid will flow through the tubes *d* or d^1 from A to C, the quantity delivered each time being regulated by the difference in the levels of the lower end of the pipe d^1 and of the end *e* of the syphon, the supply of the disinfecting fluid necessarily ceasing as soon as the lower end of the tube d^1 is covered, as no air can then enter the upper reservoir A. In adapting this invention to valve closets, where the water is supplied under pressure direct from the water mains or other sources, the lower end of the syphon E is connected to the supply-pipe between the stop-valve and the closet-basin. To fill the reservoir A with disinfecting fluid without waste, although such waste would be very small, owing to the small apertures of the connecting tubes *d* d^1, but in case some other form of connection might be desirable, he employs a funnel, the lower end of which is stopped by a cork or other substance that will fit closely into the lower neck of the reservoir A, the fluid being delivered from openings in the sides of the stem of the funnel. In cases where other than liquid disinfectants are employed, or in cases in which the liquid is of a pasty consistency, he dispenses with the upper reservoir A and the connecting tubes *d* and d^1, and places the disinfectant in the cistern C, the water entering the cistern C, in the manner before described, through the syphon E: it will dissolve or dilute a certain portion of the disinfectant and carry it to the water-closet, when the supply of flushing water is stopped.

4518. (1880.) DISINFECTING CLOSET PANS, &c. H. SEWARD, LONDON. [6d.]—This invention relates to the utilization of the properties of carbolic acid and other volatile disinfectants, as a means of disinfection, applied to closet pans or otherwise to any portion of the drain or soil pipes by means of the apparatus. Fig. I. represents a water-closet; Fig. 2 represents a water-closet syphon, and Fig. 3 represents a drain pipe, each disinfected by means

Fig. 1.

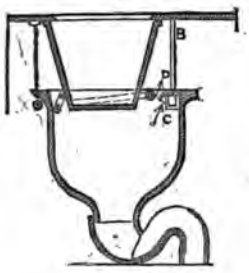
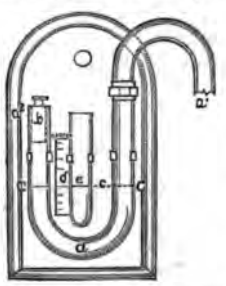


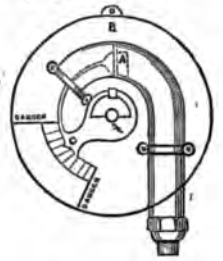
Fig. 2.

Fig. 3.

of this invention. A is the chamber, the lower part of which is filled through the supply-pipe B, with carbolic acid or other volatile disinfectant to a convenient height, which may be regulated by the use of an arrangement of valve and float, or by the use of an overflow pipe. Preferably, however, the capacity of the chamber being approximately known, he allows any surplus supply poured in to flow away through the orifice C. This orifice C allows the vapour of the disinfectant to pass from the chamber, and to mingle freely with any noxious gases arising from below, and to deprive them of their deleterious qualities. D is an overhanging cover which protects the lower part of the chamber A from the influx of any effluent water. This overhanging cover is conveniently formed by extending the cover of the chamber. In Fig. I. the container of the water-closet is shown enlarged to admit of the chamber being placed inside it, but it may be fixed on to the outside, a portion of the container sufficient to allow of the free passage of the disinfectant vapour being cut away in correspondence with the orifice of the chamber; or the chamber and overhanging cover may be formed in the substance itself of the container in the manner similar to that shown in Fig. II. In Fig. III. the chamber is shown completely encircling the drain pipe and formed in its substance a little distance below a gully-trap.

4540. (1880.) APPARATUS FOR DETECTING THE ESCAPE OF NOXIOUS GASES FROM DRAINS. R. H. REEVES, PARKHURST, I. OF WIGHT. [6d.]—This invention consists in an apparatus adapted to detect the existence and also to indicate the amount of noxious gases (vapour poisons and poisonous organic germs) arising from drains, and which will also show when such gases become dangerous to health. The apparatus consists of a tube of glass, and which in use is attached to the drain, the amount or variation of pressure being indicated by a column of liquid. The liquid employed is composed of a





chemical re-agent which, on contact with the air from the drain, will detect the variation of pressure of noxious gas, and will thus at once pneumatically show on an indicator applied the amount of pressure. The tube employed is **U** shaped, such as represented by Fig. 1. This tube *a* is fixed vertically in a suitable case, ths extremity a^1 thereof being attached by an india-rubber pipe to the drain. In the other extremity a^2 is inserted the indicator *b*, which is composed of test paper prepared so as to be sensitive to the re-agent afterwards described. The tube *a* is partially filled, say, up to the dotted lines *c*, with a chemical re-agent in solution, which on contact with sewer gas from the drains will at once indicate by change of colour the presence of a noxious gas. The chemical re-agent employed consists of a solution of potassic permanganate acidulated with acetic acid, or a solution of auric chloride, but other re-agents may be employed. A graduated scale attached to the tube as at *d* will indicate any variation of pressure in the drains. The action of the apparatus is as follows:—When attached to the drain, pressure of gas therein will cause the liquid *c* to rise in the arm a^2, the extent of pressure being indicated against the graduated scale, whilst the noxious character of it will be indicated by discoloration of the re-agent, and in order to determine the amount of discoloration a separate tube *e* containing a similar solution c^1 is attached to a convenient part of the case of the apparatus. When the liquid or re-agent has become discoloured throughout it is an indication that there is an escape of noxious gas. The extent of pressure being equal at all outlets, the escape of gas shown by the apparatus will be the same as at any traps connected with the drain. When it is necessary to fix the apparatus in places where the re-agent in solution would be affected by frost the **U** tube is reversed, as shown by Fig. 2, and the test-paper wad A is used instead of the re-agent in solution, it being attached to an india-rubber washer or disc B, the pressure being indicated by the guide *c* working on a pivot, the pressure of the gas moving the wad, and the discoloration of the same being similar to that of the re-agent in solution. In order to detect whether poisonous gases are generated and discharged from any old cesspits attached to drains, or that the fittings are defective, so as to allow the escape of gases, he seals both ends of the drain on which the apparatus is fixed, then partially filling

the drain with water the apparatus will at once indicate whether the gas is generated otherwise than by the flow of sewage, or if any defects or faulty construction exists which would allow the gas to escape.

4853. (1880.) SEWER AND DRAIN PIPES, &C. : J. LOVEGROVE, C.E., LONDON. [6d.].—This patent has reference to improvements in sewer and drain-pipes, lampholes, clearing shafts, &c., and gulley and drain-pipes. Mr. Lovegrove provides an escape or overflow passage along the top or within the pipes forming part thereof, and being in connection therewith. The top of the drain channel forms the bottom of the overflow tube, and is perforated or has provided small slit shaped openings, the top of this tube is continuous in cross section with the outside of the remaining portion of the pipes, so as to fit pipe by pipe either with butt joint, or butt joint and collar, or spigot and socket joint, or may be made to

Fig. 1. Fig. 2.

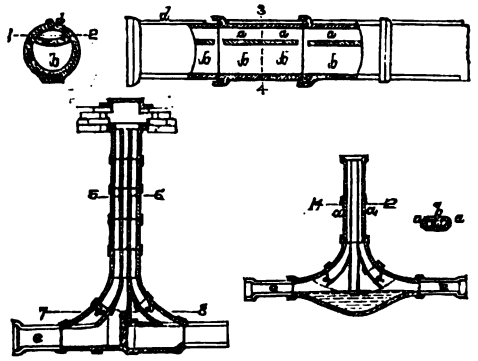
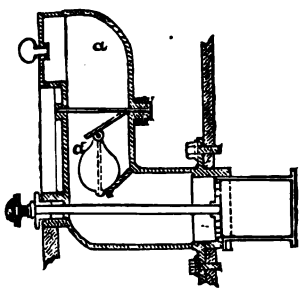


Fig. 16. Fig. 20.

fit any form of joint. Figs. 1, 2 show the arrangement of the overflow way for a circular shape; Fig. 1 is a cross section; Fig. 2 is a part elevation and part longitudinal section. In each Figure *a* is the overflow tube; *b*, the channel through which the sewage ordinarily flows; *c*, the inlet to the overflow channels. In the circular form a continuous line or band is fixed along the top and bottom of the pipes, as shown at *d* in Figs. 1 and 2, so as to ensure a correct placing of the pipes and a continuous line of overflow channel. In the event of an obstruction taking place in the pipe the water in the surcharged portion will escape upwards through the perforations at *c* into the overflow tube, or way, and flow over the obstruction, and after passing same will flow downwards into the pipes and pass away, and so continue until the obstruction is removed. Junction pipes may be formed so as to continue the same principle along the course of the branch sewers. This principle is also applied to small brick sewers by fixing a course of hollow stoneware blocks along the crown of the sewers for the overflow of the sewage from the sewer, in the event of a stoppage through slits at the joints or perforations into and through the overflow channels formed with the block course. To facilitate the removal of obstructions in the drain or sewer pipes, he fixes in positions convenient for access in the line of sewer or drain, lamp hole and clearing shafts combined (see Fig. 16), partly vertical and partly curved. The shaft is divided vertically by two divisions into three spaces *a*, *b*, *a*, the dividing stops *c*, *c*, form a guide for the bamboo cane rods as they are screwed together in short lengths and passed down the shaft, first one side and then the other, into the sewer or drain at *e*. The outside vertical portions of the shaft being connected at the lower end with the pipes by means of a curved pipe and junction, as shown at *d*, through which the rods will easily bend into and along the drain or sewer, either down the stream or against the stream for a distance of two hundred feet, more or less, as may be needful, and worked until the obstruction is removed. The centre space *b* of the shaft is provided to show the condition of the pipes: it is vertical, and so formed that a light may be lowered, or a rod passed down for clearing the central portion of the drain between the points of connection of the curved shafts on either side.

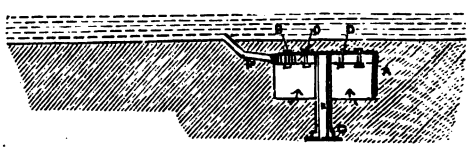
4554. (1880.) SHIPS' VENTILATORS: J. W. SHEPHERD AND G. LINES, LONDON. [6d.]—One end of the pipe *a* opens into the cabin, and the other through the ship's side; *b* is a cylinder having a perforated end, and



also an opening in its side to serve as a collector. When a current of air is desired, the cylinder *b* is pushed out as shown; at other times it is drawn in: *d* is floating valve to prevent entrance of water.

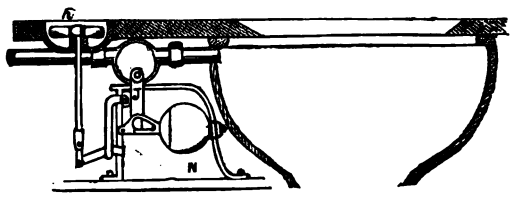
AMERICAN PATENTS.

238,439. WATER SUPPLY FOR CITIES: CHARLES H. ROBERTS, EVANSVILLE, IND. Issued March 1, 1881.—*Claim* 1. A filtering apparatus constructed as described, and adapted to be planted in the bed of a river by means of suction or otherwise, in combination with a supply-conduit connected to the receiver and extending along the bottom of the stream to the shore, whereby the water of the stream is filtered by being drawn through the river-bed by suction applied to the conduit, into and through said receiver, and



thence conveyed to the reservoirs for general distribution. 2. A filtering receiver consisting of the case A, divided into two compartments by the foraminous diaphragm C, and having an eduction-pipe K, and provided with means whereby the receiver may be planted in the bed of a river by suction. 3. In combination with the strainer the central tube and its concavo-convex disk, whereby the casing may be sunk in the bed of the stream.

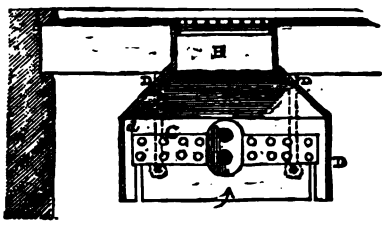
238,453. MECHANISM FOR OPERATING THE VALVES OF WATER-CLOSETS: JAS. H. SPENCER, PHILADELPHIA, PA. Filed Dec. 20, 1880. (Model.) Issued March 1, 1881.—*Claim* 1. The combination of the water-pipe E of a water-closet, a valve-chest, and a valve for permitting and obstructing the flow of water through the said pipe with a self-expanding air-receptacle having an opening or openings for the reception and expulsion of air, and with



mechanism through the medium of which the valve may be opened and the receptacle contracted by hand, and through which the valve may be closed by automatic expansion of the air-receptacle. 2. The combination of the pipe E, its valve-chest, and valve with the air-receptacle and intervening mechanism, as described, and with a valve for

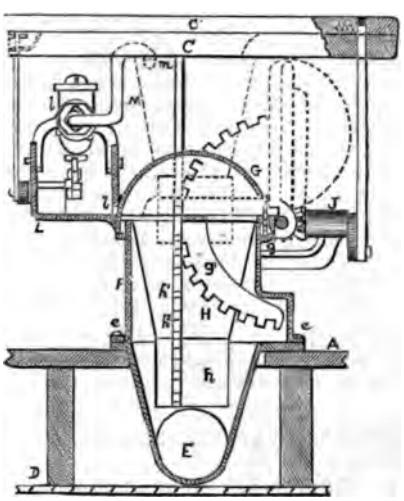
lating the admission of air to the said receptacle. he combination of the arm H, bent at its upper end, a valve G, having a socket *w*, adapted to the rounded of the arm and with a pin *x*, passing through the et and through the within-described opening in the all substantially as described.

8,469. APPARATUS FOR HEATING BUILDINGS: IN A. WOOD, UTICA, N. Y. Filed Feb. 9, 1880. d Mar. 1, 1881.—*Claim* 1. In an air-heating e, the combination of an outstanding radiator, ele- l as described, with an inclosing register-flue, said flue



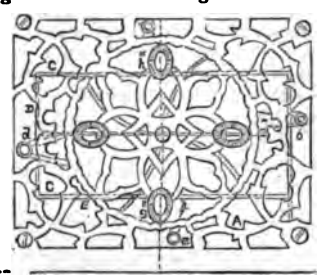
enlarged in an outwardly and downwardly inclined tion, so as to embrace said radiator therein, the supply r to be heated being admitted to the radiator at the m of the same and conducted to the apartment to be d without being obstructed by rectangular corners as orth. 2. The combination, in a steam or hot-water ratus, of the casing D, elevated as described, having ed top D^2 D^2, discharge-passage B, and an open m, and the heater C, having inlet and outlet pipes, nstructed as described, and for the purpose set forth.

9,037. WATER-CLOSET: ABRAHAM EDWARDS, ADELPHIA, PA. Filed June 2, 1880. (No model.) d Mar. 22, 1881.—*Claim* 1. In a water-closet, a ally moving bowl and means, substantially as de- d, for raising and lowering the same, said bowl open at its base and communicating with the trap ischarge-pipe. 2. In a water-closet, a section F ed to receive a bowl H in combination with a ally-movable bowl and a cap G, which closes down said bowl when the latter is lowered, and forms with



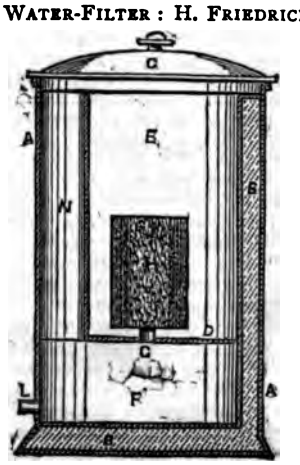
section a seal or joint, substantially as and for the se set forth. 3. In combination with a sta- y section F, a vertically-movable bowl H, having k *h* formed integral therewith, and serving as a con- n or conduit between said section and bowl when tter is elevated, as set forth. 4. The combination of n F, with trough or channel *f*, hinged cap G, with ntal cogged arms g^1 g^1, vertically-movable bowl H, g neck *h*, with ribs h^1 h^1, and seat-lid C^1, substan- shown and described. 5. In combination with the section F and bowl H, vertically-movable into and out of the same, the cap G, hinged to one side of the same, its pintle G^1 being parallel with the major axes of said section and bowl, substantially as shown and described. 6. The section F, formed with a drip-cup L, in combination with the valve *l* and mercury-trough *f*, substantially as shown and described. 7. In combination with section F, having drip-cup L, with opening l^1, the cup G having valve g^2, substantially as shown and described. 8. The combination, in a water-closet, of a seat-lid and seal or joint cap, constructed and arranged to lift at right angles to each other, substantially as shown and described. 9. The combination of seat-lid C^1, seal-cap G, rod I, shaft K, and counter-shaft G^1, substantially as shown and described. 10. In a water-closet, the combination, with the hinged seat-cover, of a vertically-sliding bowl and mechanism, substantially as described, for raising and lowering said bowl according as the seat-cover is lifted or let down, as set forth.

239,248. HOT-AIR REGISTER: WILLIAM HIGHTON, MALDEN, MASS. Filed Feb. 1, 1881. (No model.) Issued March 22, 1881.—*Claim* 1. In a ventilator or hot-air register, the combination, with the grate or front plate A, and the valve-operating wheel or device E, of a series of letters or symbols adapted to remain constantly in view, each formed partly on the grate or front plate A, and partly on the wheel E, the said parts of letters or symbols having such relative arrangement with respect to



each other that a movement of the wheel in one direction will cause them to form complete letters or symbols, indicating that the valves are open, and a movement of the wheel in the opposite direction will form complete letters or symbols indicating that the valves are shut, substantially as described. 2. In a ventilator or hot-air register, the combination, with the grate or front plate A, and the valve-operating wheel or device E, of one or more letters or symbols adapted to remain constantly in view, each formed of two parts—one on the front plate and the other on the wheel—the two parts of each letter or symbol being so constructed and arranged as to form, when in different relative positions with respect to each other, two different letters or symbols for indicating different conditions of the valves, whether open or shut, substantially as set forth.

239,258. WATER-FILTER: H. FRIEDRICH W. KOLT-

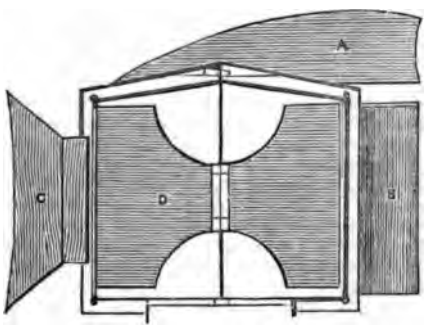


HOFF, and ALBERT PERKUHN, CINCINATTI, OHIO. Filed Oct. 18, 1880. (No model.) Issued March 22, 1881.—*Brief.* The filter is divided into three compartments, E F N. The compartments F E are separated by an imperforate diaphragm having centrally located upon it and passing through it a tube G, which conveys the filtered water from the artificial-stone filtering-core into the chamber F, where the water is constantly in contact with ice kept in the chamber or pocket N, which chamber is in direct communication with F. *Claim* 1. The combination of vessel A, imperforate partition D, chambers E F, porous filtering-core H, and ice-pocket N, which pocket communicates with the lower chamber F, as herein described. 2. The interiorly-threaded and ribbed nut I J, embedded in the filtering-core H, and anchored therein by baking said core around said nut, for the purpose specified.

239,284. CASING FOR WATER-PIPES: WILHELM WEISBARTH, OFFENBACH-ON-THE-MAIN, GERMANY. Filed May 12, 1880. (No model.) Patented in Germany Feb. 17, 1880, Belgium March 17, 1880, and in France

March 25, 1880. Issued March 22, 1881.—*Claim* 1. In combination with the main water-pipe, the casing A, having doors L, guide rings *m*, creases *o*, and internal pipe *p*, which prevents the escape of water from said casing, substantially as set forth. 2. A metal casing A, surrounding the water-pipes inside of a building, provided with openings K, in combination with sliding doors L, having guiding-rings *m m* at the ends, substantially in the manner and for the purpose herein described.

239,359. VENTILATOR: LEVI J. WING, NEW YORK, N. Y. Filed March 17, 1880. (Model.) Issued March 29, 1881.—*Claim.* In combination with the revolving



hood A, provided with vane *a*, and supported and turning upon socketed truss E, and spindle F, the funnel-shaped tube C, vertical fans D, and shaft G, substantially as and for the purpose set forth.

SANITARY INVENTION.

SLATER'S PATENT DISINFECTING HOSPITAL BLANKETS.

Under this title Messrs. H. & L. Slater have introduced a chartaline or paper blanket, containing between the layers of perforated paper, cotton wool impregnated with carbolic acid. These blankets are pliable and free from crackling, cheap, warm, and light. The addition of the disinfectant to the layer of cotton wool is obviously useful in the treatment of cases of infectious disease, and we do not doubt that these blankets, which may be purchased at three shillings each retail will find considerable favour when sick nursing has to be carried out, or in infectious cases, whether in the home or in the hospital.

NOTICES OF MEETINGS.

THE ABATEMENT OF SMOKE.

THE Kyrle and National Health Societies are arranging an Exhibition of Improved Heating and Lighting Appliances, to be held at South Kensington, London, on the 24th of October, and to close on the 26th of November next. We are glad to see that a great number of new patents have been taken out in response to the public demand for them. The presidents of the Exhibition are H.R.H. Prince Leopold, Duke of Albany, K.G., and the Duke of Westminster, K.G., assisted by an influential executive committee.

SANITARY ASSURANCE ASSOCIATION.

The First General Meeting of the Members and the Honorary Council of the Sanitary Assurance Association since its incorporation in February last, was held recently at the Offices of the Association, 5, Argyll Place, W. In the unavoidable absence of Sir Joseph Fayrer, K.C.S.I., F.R.S., the President, Professor Hayter Lewis, F.S.A., Vice-President, occupied the Chair, and was supported by Sir Richard Temple, Bart.: Captain Douglas Galton, C.B., F.R.S.; Mr. Romanes, F.R.S.; Mr. Geo. Aitchison, A.R.A.; Professor Corfield, M.D.; Mr. John Whitcord, F.R.I.B.A.; Mr. Mark Judge; and Mr. H. Rutherfurd. Professor Corfield (Chief Sanitary Officer), and Mr. Judge (Surveyor), related to the meeting the progress of the Association, and reported on the work of Sanitary inspection that had been done. The property which had been placed on the Assurance register varied in value from houses rated at £60 a year, in which the total fee to subscribers for report, supervison of work, and certificate is two guineas, to houses rated as high as £700 a year, with proportionately increased fees. The Association undertakes the inspection of the smallest class of property, and no fee is charged to subscribers for a single house rated at £20, while the fee is only half a guinea for houses rated at £40. In the discussion which followed, Sir Richard Temple, Captain Douglas Galton, and Mr. Whitcord, spoke strongly in support of the objects of the Association, and the Council were requested to take steps to make the Association as widely known as possible, and particularly to call the attention of the proprietors of large building estates to the advantages which would accrue if the certificate of the Association was made essential to the granting of leases. Professor Hayter Lewis said he trusted that speculating builders would soon recognise the value of the certificate of the Association, for there could be no doubt that houses certified as in a satisfactory sanitary condition by the Association would be of greater value in consequence.

We have received a circular from the Early Closing Association, urging upon the public the necessity of not shopping after seven o'clock. At this season of the year, after a long day's labour and in hot shops, it is doubly necessary that the young people employed in them should be able to have at least an hour or so of recreation in the streets and parks. There are very few classes of the community who cannot make their purchases before this time, and we are sure that a little thought will induce the vast majority to adopt the practice, so as to afford a little needful change to the great numbers of young men and women employed as shop assistants in London.

ORIGINAL PAPERS.

MODERN SANITARY SCIENCE.*

By PROF. F. S. B. F. DE CHAUMONT, M.D., F.R.S.,
Professor of Military Surgery, Army Military School, Netley.

THE title of this address, 'Modern Sanitary Science', has been adopted, not without reason, for it is essentially 'modern' views that demand our attention, however much we may feel we owe to the past. We know that our forefathers were not entirely blind to the necessity of caring for their own health and that of the community—and we can trace back into the night of time rules or traditions which were no doubt as much the outcome, in some instances at least, of previous practical experience as of the superstition to which it has been too much the custom to attribute them. But much, if not the greater part of all this was unintelligent, in the sense that it was either the result of a more or less indiscriminating experience, or a blind following of a previously-acquired habit. In many cases, doubtless, there gradually arose around the practices in question myths of a more or less fantastic character, relics of which linger in our practices of the present day. Many savage tribes, and many who cannot by any means be called so in other things, attempt to propitiate the Spirit of Evil in order to avert disease among other woes, just as the Hindûs worshipped the Goddess of Small-pox, until they found in vaccination a more practical though less awe-inspiring protector. It would not be difficult, however, to show that the vaunted civilisation of our own Western Races is but little in advance of those whom we are inclined to despise. When cholera invaded this country some thirty years ago, some worthy people petitioned the late Lord Palmerston to appoint a day of humiliation and prayer for the purpose of warding off the dreaded disease. This was too much for the keen practical sense of that great statesman, and he declined to accede to the petition, at the same time recommending them to resort beforehand to the more prosaic, but not less necessary work, of cleaning their own dwellings and cities, on the principle that Heaven helps those who help themselves.

When, therefore, I speak of 'Modern Sanitary Science', I desire to look at the question from a point of view that shall have nothing 'aberglaubisch' about it—I wish that we should be prepared to take up the subject on as strict a scientific footing as existing circumstances will allow, and to treat it in the same way as we treat astronomy and physics. Astronomers do not look to supernatural or extraordinary causes to account for phenomena that are even themselves apparently out of usual reckoning. When a comet appears that has not been seen before, they simply know this, that it is another proof of the immense amount of possible knowledge that is still unascertained; but instead of merely wondering, they proceed straightly to study the phenomenon, to note all that can be observed about it, to calculate its orbit, and its various astronomical elements,—so that before it takes its departure it is possible to say, not *adieu*, but *au revoir*, the astronomer having pretty accurately ascertained when its return may be expected, and leaving behind him a full, true, and particular description by which it may be known by future ages. Similarly, the physical philosopher knows perfectly well that any new phenomenon, however apparently remarkable, will be explicable on ascertained laws, or upon others to which these will merely lead up. The supernatural, or rather, extra-natural in those is left to astrologers, spiritualists, and the like, with which true science does not trouble itself.

So much for the expression, 'Modern'. It may now be asked—Is the expression 'Sanitary Science' justified? Well, this is a point on which a good deal might be said, both for and against,—but I may say, preliminarily, that the expression is pretty generally accepted, and has taken its place in our vocabulary. Some of the Universities and Licensing Bodies have adopted it, and issue diplomas and certificates in 'Sanitary Science'—but this of course by no means vindicates the claims of Sanitation or Hygiene to the dignity of a Science. If, however, we were to push this principle too far, we should have to modify our nomenclature considerably, and refuse the name of Science to many respectable branches of inquiry. It would be extremely difficult, otherwise, to use the expression accurately; for it would be impossible to draw any hard and fast line as to how much of the particular knowledge was or was not so evidently under the rule of fixed law, as to enable us to predict what would occur under certain circumstances. It may suffice, I think, for practical purposes, to use the expression science, either for a branch of knowledge, which, like Astronomy, is so rigidly and *evidently* under the reign of law, that events of almost any distance in space or time may be confidently and accurately forecast, or for such branches of knowledge as have not yet been ascertained to be so rigidly governed by laws *known to us*, but which we propose and try to inquire into on true scientific principles, and to the exclusion of mere metaphysics or extra-natural speculatives. To these last belong Social Science, Political Economy, etc., and to the same class we must for the time relegate Sanitary Science, at least provisionally. But we know and feel that this comparatively inferior position will only be temporary, and that as Biology and other collateral sciences advance, so will Sanitary Science receive promotion, and ultimately vindicate for itself a position in a more honourable and exalted sphere.

At present, in Sanitary Matters we are working to a great extent, not perhaps actually in the dark, but by the light of somewhat indifferent illumination,—resembling in some instances that darkness visible which gives weird outlines to objects that would be simple and ordinary enough in the broad light of day—outlines that impress the visual faculties of different observers so variously, that each is apt to draw his own conclusion, and treat with contumely that of his neighbour. But by persistent and careful work the eye becomes accustomed even to the dim light, and may make out with accuracy of detail the nature of the phenomenon observed, but it will only be by careful co-operation and by getting access to it from various directions, that that complete and full illumination will be accomplished that shall make it an object recognisable for all time. Thus every one connected with Sanitation may contribute to the fashioning of the whole by bringing his contribution of accurate and careful observation and record, leaving hypotheses and theories to take care of themselves, until the proper time shall come when they may be legitimately formulated. Every step that we can take in the direction of mathematical precision, by reducing to weights and measures all phenomena capable of such resolution, is a step in the true direction of scientific accuracy, and will lead to the advancement of the less certain Sciences to a higher

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* Address delivered at the Annual Meeting of the Sanitary Institute of Great Britain, July 14, 1881.

status. Such mathematical application has been found possible even in Political Economy and Social Science, how much more likely is it to be possible in Sanitary Science, which is already founded on the bases of the more exact sciences to so large an extent? We may, therefore, look hopefully to the future, and confidently apply the term Science to Sanitation, if we approach the work in the spirit I have indicated, with honest and humble endeavour to question nature, not to dictate to her, to seek honestly for the truth, and not merely for the means of establishing our *doxy* and upsetting our neighbour's.

It may now be legitimately asked what Modern Sanitary Science really is, and how far it justifies the demand that we should regard it with favour? We may consider this question with reference to the following points: 1st. What are the objects of Sanitary Science, and on what principles is it based? 2nd. How are those objects to be carried out, and how are the principles to be applied? 3rd. What has been achieved up to the present time? and 4th. What are the prospects for the future?

1. What are the objects of Sanitary Science? These are simple and obvious. It desires to preserve the lives and health of the community. It seeks to diminish the inordinate waste of life which is continually going on. Even now, one-half of the population dying in childhood is throughout its existence absolutely unproductive. The average age at death throughout the United Kingdom is only thirty-nine, of which barely one-half has been productive. On the other hand, the average in our great cities has been shown by Dr. Farr to be much lower, as low as twenty-six in Liverpool, so that there is hardly one-third of this productive. This evil, if left to itself, tends to increase, from the continual removal of the populace from the country into the town, and the consequent multiplication of insanitary influences. Sanitary Science further proposes that lives shall not only be preserved, but that they shall be preserved under the best possible circumstances, with health and strength to enable them not only to find means of supporting themselves and those dependent upon them, but also of adding to the wealth and productiveness of the community and nation at large. It desires to extinguish diseases recognised already as preventible, and to seek out the causes and favouring conditions of others, in the hopes that they too may be prevented. What are the principles on which the Science is based? Here we find a question difficult to answer if rigidly scientific grounds are looked for, but we may still formulate certain principles which shall serve well enough for practical purposes. In the first place, we base it upon the knowledge positively obtainable through other branches of science. We appeal to geology, mineralogy, physiography, etc., for information with reference to the ground that we live upon. We are enabled to know its composition, the order of its strata, the character of its surface, and the vegetation that covers it; we appeal to chemistry and physics to tell us the character and movements of the water and the air in the ground and in the atmosphere; we ascertain what are the normal constituents, and in what way there is occasional deviation from the usual standard; we ascertain from physiology the healthy condition of the human functions and the circumstances under which change takes place; we go to medicine and obtain a knowledge of disease, how it is to be accurately diagnosed, what are the phenomena accompanying it, and whether or not it seems to be capable of being directly communicated from individual to individual. Morbid anatomy, with the aid of the microscope and animal chemistry, tells us the particular organs affected, and the nature and characters of the resulting changes. All these are scientific facts upon which to build superstructure. But here the difficulty begins: we have to obtain most careful and trustworthy observations in order that we may connect disease with certain circumstances which may be observed and investigated; and, above all, we must be able to approach the investigation with minds as little biassed as may be. Unfortunately, a mind free from prejudice is a rare thing, and hence the many mistakes in this as in other things. We may say, however, that we have ascertained certain points, or so nearly ascertained them, as to make it practically a matter of certainty. Some diseases have been actually traced to active causes, or at least the possibility of communicating them with certainty has been so well demonstrated as to limit the area of search. Others still remain more or less unsolved problems, although we have made some progress in ascertaining the conditions favouring their propagation. We are at all events pretty certain of this, that diseases do not arise indifferently, but are due to certain causes, which we hope will admit hereafter of being traced out and analysed. Recently, researches by various inquirers have held out hopes of still further progress being made, so that not only the real active causes of individual maladies may be demonstrated, but even that it may be possible so to treat and, as it were, cultivate those *verae causae*, as to produce a benign agent which shall protect from the severer form, just as vaccine virus does from small-pox. In the meantime, we have ascertained by the evidence of repeated observation that certain conditions of existence are unfavourable to health and favourable to the development of certain diseases; that the living on a wet and contaminated soil, the drinking of polluted water, the breathing of a vitiated atmosphere, the crowding together of human beings, all have their own powerful influence in favouring the spread of disease. To these we may add improper and insufficient nourishment and clothing, besides other points of personal hygiene, such as personal cleanliness, individual excesses, etc. Now, although it may be said that after all there are no great fixed scientific principles here, such as the law of gravity or of chemical affinity, yet we may claim so far to have come to a general principle of some importance, and that is this: that human ills, in a sanitary point of view, arise from the presence of matter in the wrong place. Everything has its uses in this world, but anything may be fraught with immeasurable evil if it be put to wrong use. In no case is this clearer than in Sanitation. We have to defend the organic frame that constitutes our body against the various antagonistic organic substances that are external to us. What we require is a continual and proper redistribution of matter, an unremitting attention to the great problem of how matter is to be taken to its proper place in the world, where it shall expend its potential energy in useful productive work, and not in effecting the destruction, rapid or gradual, of the human race. It is only in modern times that the important bearing of this great principle has been distinctly recognised, and chiefly since the circulation of matter was understood, as well as the real origin of the energy of organic bodies.

2. How are those objects to be carried out, and how are those principles to be applied?

Bearing in mind the principle of the redistribution of matter, we may say that this may be best carried

out by seeing that the appropriate place be found for all kinds of matter; and that matter (particularly organic matter) be allowed to remain nowhere where it is likely to expend its energy in the propagation of such low forms of life as are believed to be inimical to human economy. Thus, we must carry out such means of removal as shall carry away from our dwellings at once all refuse, both excretory and other; we must effectually prevent the entrance into our dwellings of any injurious matter from without, either in the form of effluvia from drains or other nuisances, or of emanations from the soil on which the house is situated; we must cause an efficient and continuous change of air in our living and sleeping rooms, so that as little of the excreta of our skin and lungs shall return to us again as we can possibly prevent; we must cease to pollute the soil and the watercourses of the country with organic filth, but use such material for purposes of cultivation, so as to utilise it, instead of, as at present, poisoning ourselves and our neighbours, or throwing it into the sea; we must obtain pure and wholesome drinking water under such conditions as shall render contamination impossible. We must practise the most rigid cleanliness in person, clothing, and dwelling, and have ample air-space, so as to prevent over-crowding. We must further try and scatter our town population more, by attempting to provide better dwellings, and by providing more open spaces, so as to form lungs for the towns. The advantages of this last principle are very considerable, and have been dwelt upon by many writers. London is undoubtedly the healthiest of the great cities of the world, and it compares favourably in point of space with most others. Paris is computed to have forty square mètres per head, whereas London has more than double. Dr. Farr has shown that the death-rate in this country corresponds very markedly with the degree of proximity of the population. Liverpool, where the average distance from person to person is only seven yards, loses annually one person out of twenty-six, and the mean duration of life is only twenty-six years. Manchester, where the people are seventeen yards apart, loses only one in thirty-one, and has three years more of life—nine districts, twenty-eight yards apart, lose one in thirty-six, and have an average duration of thirty-two years, and they proceed thus:—

74	districts,	46	yards apart,	lose	1	in	40,	and live 35 years.
137	,,	97	,,	,,	46	,,	40	,,
345	,,	139	,,	,,	53	,,	45	,,
53	,,	147	,,	,,	60	,,	51	,,

These numbers are very significant, showing as they do the very great influence which crowding exercises on the health of the community—even when considered on this somewhat wide and general scale. In particular instances, according to degree, it has been recognised as one of the most disastrous factors in the propagation of typhus, plague, small-pox, and many other fatal diseases.

Another great work of sanitation is the improvement of the food of the people, and it here joins hands with political economy in attempting to increase the quality and the sources of food. To ensure also that the food shall be good and wholesome, in a sound condition itself, and free from dangerous or deteriorating adulteration, is another branch of the subject of the utmost importance.

We must also extend the knowledge of the public on sanitary matters to the widest extent. Much of the success in all these endeavours depends upon them, and without their co-operation little real progress can be hoped for.

3. What has been achieved up to the present time?—It has sometimes been said, that with all our boasted efforts Sanitation has not done much to diminish the death-rate of the community. Is this true? Hardly, I think. The returns of the last census have just shown two points,—1st. That the birth-rate is larger than was expected, and 2nd, that the death-rate was smaller than was expected during the last ten years. The former is not a point that tells so directly in favour of Sanitation, dependent as it probably is upon an increase of general prosperity, a higher rate of wages, and the consequent possibility of obtaining the necessaries of life with greater ease. But the second, the lower death-rate, is on a different footing. Had the rate continued between 1871 and 1881 the same as between 1861 and 1871, there would have died in England and Wales alone nearly 300,000 persons who are now living, a convincing proof that, as Lord Carrington told the House of Lords on the 5th instant, 'modern Sanitary legislation had produced useful and important effects.' This is a diminution of 5 per cent. on the death-rate, or an addition of more than a year to the mean age of the community. Considering the difficulties that have attended every step in advance, and the imperfections that still exist so largely in our public measures, I think this must be accepted as a highly gratifying result, holding out great encouragement for the future. Although we are not in possession of much accurate information as to the statistics of periods before the present century, we may gather from the data that are obtainable, that very great advance has been made generally. The population of Great Britain has doubled in about sixty years in this century, and there is every probability of its doing so in about fifty years, or perhaps even less in the next period,—so that before the year 1940, Great Britain will probably have 60,000,000 of inhabitants, provided nothing interferes to arrest its present rate of increase. Some people will say that this will be a doubtful blessing,—and it will be so if the means of production do not increase in an equal ratio. Without discussing this point, and merely using the facts as a measure of the prosperity and health of the people, we find that in the last century it took nearly a hundred years to double the population. It is not easy to calculate out the details of a case when so much is wanting, but if the birth-rate had been the same as at present, this would argue a death-rate of at least 28 per 1,000, and a mean age at death of only thirty-three years. Previous to 1700, the doubling of the population must have been a very slow affair, and for a long time, what with wars at home and abroad, general or partial famines, and repeated visits of plague and other pestilences, there was in all probability a diminution of the population at many times rather than an increase. Perhaps nothing marks off modern from olden times more than our immunity from general pestilences, due in a large manner to the gradual adoption of the rules of hygiene, particularly increased cleanliness in person and dwellings and improvement in character and quality of food. Those points come out in a very striking manner when we consider the ravages made by pestilence in former times, and how gradually those have diminished down to our own day. Plague invaded this country twelve times during the seventeenth century, and at its last visit it slew 68,596 persons in one year in London and the suburbs alone. Considering that the population at that time could not have been more than a tenth of what it is now, this was equal to the entire mortality of the whole of England and Wales

from all causes at the present time. The cleansing fire of 1666 swept out of London the dens of filth, which had, from time immemorial almost, invited pestilence into the very heart of the country, and from that time the disease dwindled down, until in 1704 the very name disappeared from the bills of mortality. It is true that in the present day we have from time to time visitations of cholera, but its ravages have been as nothing compared with those pestilences of former days, but we still have other maladies, such as enteric fever and the like, which remain more or less an opprobrium upon our sanitary progress. If, however, we turn to groups of the community more directly under control, we may perhaps better appreciate what has been accomplished. Our Army and our Prisons are two good examples. The former has been especially valuable as furnishing instances, first of the evil effects of insanitary conditions, and secondly, of the excellent results of careful sanitation. Up to the time of the Crimean War, our troops, few in number and expensive to keep up, were allowed to die at a rate that would have been a disgrace to the worst managed institution. Yet those men were apparently better off than their brethren of the same rank in civil life, better fed, better clothed, and better housed, and certainly not more hardly worked. But what were the facts? At every age the deaths were double those of the similar male population of England and Wales, and much more than double, nearly three times, those of healthy districts, and they were some 50 to 60 per cent. greater than in the most unhealthy cities in the Kingdom. Her Majesty's Foot-Guards, supposed to be *élite* of the service, were the most unhealthy of all. The story of this has been often told, but I would simply point out that when the causes of such insanitary conditions were ascertained, steps were at once taken to remedy them, and that the result was even beyond expectation. And it says well for the soundness of sanitary views that even a quarter of a century ago the Royal Commissioners were able to put their hands upon the causes of disease and death, and to say, 'Remove these and you will have the soldier as healthy as the civilian'. What has been the result? If we take the table for 1878 (the last yet published) we find that instead of dying at thrice the rate of the male population of England and Wales, the chances of the soldier's life are now-a-days better than the civilian's, during the most of the years that he serves with the colours.

Ratio of Deaths per 1,000 *living at the following Ages:*

	Under 20.	20 and under 25	25 and under 30	30 and under 35	
Army at Home, 1878	2·92	4·27	5·28	9·05	
Previous 10 years 1868-77	3·09	5·42	7·89	12·52	Total Army mortality (1878) in United Kingdom: 6·53 per 1,000.
Civil Male Population: England and Wales	6·89	8·67	9·55	10·57	Before Crimean War: 18·7 per 1,000.
Healthy districts	5·83	7·30	7·93	8·36	

This is a very remarkable and encouraging result. The same may be observed in our campaigns since the Crimean period, although they have been on the whole insignificant. They have, however, generally been signalised by a much smaller degree of sickness and mortality than in any previous experience. The immense importance of this, in operations of war, may be recognised when we consider the proportion that the losses from sickness bear to those from the shot and shell of the enemy. Were the latter the only danger in war, it would be almost comparatively insignificant. In the Crimean war we lost 22,000 men, of whom only 4,000 died in battle or of wounds; the French lost about 20,000 in battle, and about 80,000 from disease; the Russians are believed to have lost about 80,000 in battle, and about half-a-million from disease. The American war showed the same; the Northern army lost 97,000 from battle, and 184,000 from disease; the Southern lost half-a-million, by far the greatest number from disease. Our prisons tell a similar story; from being mere pest-houses in former times, they are now among the healthiest places in the Kingdom.

4. What are our prospects for the future?

I think we may say that they are on the whole encouraging. The great hold that sanitary matters have got upon the public attention is evinced in many ways, by the number of writings and discussions on the question, by the great impetus given to production of sanitary apparatus and requirements, as shown by the success of Sanitary Exhibitions in various places, notably those in connection with this Institute, and the great Exhibition recently open. We may cite the numerous societies for Sanitary purposes lately founded, and the steps taken for giving instruction and issuing certificates in Sanitary Science. The legislation on the subject has also been encouraging, although falling far short of what is still desirable; and the valuable enquiries, carried out by the Medical Department of the Local Government Board, have done much to advance the cause. There is one point on which we ought to insist, and that is, more extended means of instruction for all classes, and the exaction of certificates of competency from all who are officially charged with Sanitary duties—Medical Officers of Health, Borough and District Surveyors, and Inspectors of Nuisances. At present such certificates are entirely voluntary, and are taken by few. The Sanitary Institute is endeavouring to push this matter by examining Surveyors and Inspectors of Nuisances, and has already done good work. But means of instruction are still much wanted. We desire also that Sanitary knowledge should be distributed as widely as possible, as legislation is of but little use if it goes too far ahead of the knowledge and intelligence of the people.

In order to ascertain the alkalinity of springs on the spot, with samples not exceeding 10 c.c., and with a single reagent; Herr V. Wartha (*Berichte der Deutschen Chemischen Gesellschaft zu Berlin*, Vol. 13, No. 11,) makes use of a tube of 30 to 40 c.m. long, closed at the bottom, and with a mark showing the capacity of 10 c.c. From this mark upwards the tube is graduated into 0.1 c.c. To determine the temporary hardness the tube is filled to the lowest mark with the water in question, and a little piece of filter-paper, which has been previously steeped in extract of logwood and dried, is thrown in, thus giving the water a violet colour. Centinormal hydrochloric acid is then added from a dropping bottle, till the colour of the liquid inclines to an orange. The tube is then closed with the thumb and well shaken. The greater part of the carbonic acid escapes, and the liquid becomes red again. Acid is again added, and the shaking repeated until the next drop of the acid turns the liquid to a pure lemon-yellow, a point which with a little practice is easily reached. The amount of acid used is read off on the tube itself. The author proposes to express the alkalinity of a water by the number of c.c. of centinormal acid needed to neutralise 10 c.c. He thinks that this method will be found useful both for sanitary and geological purposes.

THE SANITARY STATE OF ROME.

By LAUCHLAN AITKEN, M.D., F.R.C.P. Rome.

(*Continued from page* 8.)

II.—PREVALENT DISEASES.

WERE a visitor asked "What are the prevailing diseases in Rome?" his inevitable reply would be "fevers." Faint as his recollections of his classical dictionary may be, he may possibly remember that the Romans worshipped the Dea Febris, or he may have seen the altars of the goddess. His guide-books provide him with the stock quotations from Cicero and Horace, from Livy and Pliny, to show that they were well acquainted with the dangers of particular parts of the City and Campagna. He has read enough to be convinced that there has been a deterioration, not an improvement, since the days of the empire; that the invasions of Alaric, of Attila, and of Genseric, only began the long series of inroads and ravages which converted the once smiling Campagna into a wilderness, covered it with ruins, destroyed its aqueducts, and made its soil the forcing-bed of a malaria which has been, ever since, a more effectual scourge than were Goths, or Huns, or Vandals. Should he have friends among the Romans of to-day, he will be struck with the frequency with which the word "Febbre" occurs in their conversation. He does not know that the term is used among them to indicate every indisposition accompanied by the slightest rise of temperature, or even without any such increase of bodily heat, that what, in fact, we call a cold, they just as often as not call a fever. It is somewhat startling on saluting a Roman to hear the reply, "I am not very well, I have a fever."

But, while it is certain that much exaggeration exists as to the prevalence of malarial fevers in Rome, the occurrence among the poorer classes, and in the autumn particularly, of intermittent, remittent, and pernicious fevers, is an only too well established fact. As to the exact number of cases, of course, no evidence is forthcoming, there being no compulsory notification of diseases of a malarial type in Rome, such as is supposed to exist for cases of a contagious character. I say supposed, because the physician gets no fee, and it is unlikely that the authorities receive information of more than a small proportion of the total number of cases of the maladies scheduled for notification. Some instructive data, however, are given in the annual reports of the hospitals, and especially in an elaborate work on the influence of weather on the production of fevers and acute lung diseases, as ascertained in the Santo Spirito, the male medical, and the San Giovanni, the female medical hospital, by Professor Francesco Scalzi, which was presented to the Meteorological Congress at Paris in 1878.

Out of the total number of patients received in 1877 into the Santo Spirito Hospital—17,453—there were 12,261 intermittent, and 275 pernicious fever cases, or, together, more than 71 per cent. of the admissions; but in the female medical hospital the proportion was much smaller, 35.8 per cent., or 1,497 out of 4,181 patients. This difference is easily explained, as the peasants from the Campagna form by far the largest proportion of those admitted into the Santo Spirito, while of the female patients entering the San Giovanni Hospital, comparatively few are engaged in agricultural labour. The number of the cases, of course, varies immensely in different seasons, some being much more malarial than others. Thus in 1877 the proportion of such fever cases admitted into the Santo Spirito Hospital was three-fourths of the total number of patients, in 1865 it was rather more than one third, and in 1864 about one half. It would be, however, a serious error to suppose that the total number of such fever cases admitted represents a like number of individual patients. The fact is, these poor wretches enter, as a rule, more than once, often indeed, many-times in the year, as they have no other resource but the hospital open to them in the frequent relapses they suffer from, when unable to change the climate or to find more healthy employments, and each time they enter they are registered as fresh cases. I find no statistics to show the exact number coming from the City and Campagna respectively, but Balestra* states that in the year 1872, the Santo Spirito received 2,349 patients from Rome, 2,931 from the province of Rome, 15,013 from other Italian provinces, and 33 foreigners, and it is certain that the majority of those from the Roman province and the other provinces of Italy were the agricultural labourers spoken of in the first article. Among the classes taking advantage of the hospitals, the relative frequency of malarial fevers must be much greater than among those in more easy circumstances, though it is also true that many, who would not think of entering hospitals with us, do so in Italy. The Italians are not provident as a rule, nothing is laid aside, no thought taken of the morrow. Hence, when ill, they are unable to obtain the food, medicine, and medical advice required, and must turn to the public institutions, a system particularly favoured by the former paternal government of Rome. Indeed, the deaths in the hospitals and other public institutions of Rome are not far short of half the total number of deaths.

Numerous, however, as are the cases, the mortality from malarial fevers, among the citizens at least, is not so startling. In the same returns, just quoted, the deaths among the 275 pernicious cases admitted in 1877 into the Santo Spirito were 59, or 21.4 per cent. Among the females at San Giovanni the proportion was, curiously enough, more than double, 47.3 per cent., or 18 cases out of the 38 admitted in the same year; and this seems the rule, as an eight years' experience at San Giovanni showed a mean mortality in pernicious fevers of 40 per cent., while at the Santo Spirito a five years' experience gave only 20 per cent. Scalzi attributes this to the position of the San Giovanni Hospital, close to the Lateran Basilica, from which it takes its name, and in a confessedly unhealthy part of the city, the parish of the Lateran having a very high death-rate, but the explanation seems insufficient.

In the reports of the Statistical Office of the Capitol there were 1,101 deaths, entered as from pernicious and sub-continued malarial fevers, in the three years 1877-79; the nnmbers being 326 in 1877, 294 in 1878, and 481 in 1879. Of those, 717 were from the city, 384 from the Campagna, and while 712 were citizens, 389 were not included in the fixed population. No cases of death arising from the after effects of ague, or malarial cachexy, are included in these numbers, but probably many of those who work in autumn on the Campagna succumb to diseases then originating, only after returning to their purer mountain air. But, although the average death-rate of 367 from malarial fevers in the three years given is

* *L'Igiene nella Campagna e Città di Roma.*

a large item in the zymotic mortality, it must be stated that both Balestra and Scalzi, in the works cited, express grave doubts as to the cases having been all correctly certified. They find that even in winter such certificates appear, and this seems so unlikely to Balestra, that he expresses his belief that, when the practitioner is in doubt as to the cause of death he simply puts it down as "Perniciosa," as an easy way out of the difficulty. In the city, at any rate, he seems to regard it as almost impossible that anyone should die of a malarial fever during the winter months, an idea quite in agreement with my own experience.

Turning, however, from the malarial fevers which are peculiar to Rome among large European cities, we find that complaints such as typhoid fever, which point more directly to its sanitary state, are by no means so prevalent as English and American visitors believe. In the quinquennium for which the mean death-rate has been given, the deaths from typhoid fever, the only form of continued fever recognised here, numbered 885, or an average of 177 annually, thus distributed :—

YEAR	1875 ...	1876 ...	1877 ...	1878 ...	1879
DEATHS...	238 ...	182 ...	159 ...	170 ...	136

The average population being 277,429, the annual typhoid mortality is thus 1 in every 1562 persons living, and as nearly as possible 2 out of every 100 deaths were caused by all the forms of continued fever embraced under the heading typhoid. I am only able to state how many of these did or did not belong to the community for the last three years of the quinquennium chosen, as the details were not published before 1877. There were 376 of the former class, 89 of the latter, in these three years. If these 89 deaths were deducted, as the Roman authorities wish to do, the results would be still more favourable. As it is, it will bear comparison with the continued fever death-rate of England. For the 29 years 1850-78, the average mortality from typhus, typhoid, and simple continued fever, with which the entry Typhoid in the Roman returns should be compared, was 3.6 out of every hundred deaths. No doubt there has been a gradual improvement in England, which still goes on. In London, out of every hundred persons dying in 1870, enteric fever was certified as the cause in 1.2, and this had fallen in the three years 1877-79 to a little more than 1.1 per cent. of all the deaths from specified causes ; but, with the exception of London, it is certain that no other European capital has a smaller death-rate from enteric fever than Rome. To show that there has been no epidemic in the last eighteen months, such as has existed in Paris, I add the typhoid mortality for that time. In 1880 it was 193, making 1 to 1570 persons living; and in the first five months of this year 70, or, bearing in mind the increase of population, considerably less than in the quinquennium given.

It thus appears that the disease most dreaded by visitors to Rome is so far from being prevalent, that its proportionate fatality is probably inferior to that from the same malady in Capitals such as Berlin, Vienna, and Brussels, about which no great outcry is ever made, and much below that of Paris, which has certainly an unhappy reputation in this respect. As all the deaths have been given for each year, and no correction made for the non-residents in the population, the figures are as bad as the worst enemy of Rome can make them. Of course it would not matter to strangers even were typhoid fever unknown among the natives, if they themselves were more liable to take the disease here than elsewhere. Out of 778 deaths from it since the beginning of 1877, up to the end of May 1881, 533 belonged and 195 did not belong to the community, quite a different proportion to that of the malarial fevers, where, as already shown, considerably more than half the deaths are those of the unregistered, and only very slightly in excess of the proportion of the deaths of non-residents to residents from all causes. How enteric fever affects English and American visitors will appear in the next article.

Though these results are favourable on the whole, they may yet become much more so in Rome. The water-supply is so good and so abundant, that no city in the world comes near it in that respect. From the aqueducts alone, it amounts to nearly 300 gallons daily for each inhabitant, and the waters do not come from contaminated rivers or lakes. The Trevi, the best drinking water, flows through the underground aqueduct, which is practically that of Agrippa, from the source* eight miles out on the Via Collatina, in a part of the Campagna where there is no population. After entering Rome, it divides at the Trinità dei Monti into different channels, which give off iron pipes, through which the water runs day and night in the fountains of the gardens, and courtyards of that part of the city supplied by it. It never enters a cistern except in a few hotels and large public buildings where water-wheels are used to pump it up, and it therefore offers us in reality, not in name only, that great desideratum of all sanitary authorities, a constant supply. It is of medium softness, and free from organic impurities. The Marcia, which is a hard water, is also carried mostly in underground iron pipes from above Subiaco, (Sublaqueum) a distance of some thirty-five miles, the supply being from an uncontaminated lake. It is a delightfully cold water, requiring no ice even in the hottest days of summer, but contains an excessive amount of different salts of lime and magnesia. The Felice, the water brought in by Pope Sixtus V, in an aqueduct built out of the ruins of the old Marcian and Claudian aqueducts mainly, also comes from pure sources, and the Aqua Paola which is largely used in the Trastevere, is the water of the lake of Bracciano, some thirty miles from Rome. The Marcia and Felice are led into cisterns, and may be contaminated by carelessness in dealing with their overflow pipes, but this was not found to be a danger in eighteen large hotels inspected by a Commission of which I was a member. There are, too, some wells existing in different parts of the city. Some of those are supplied by running streams at great depths, and of ample volume. Such are the wells at the bottom of which the Aqua Sallustiana, a water enjoying a great reputation among the Romans, can be seen flowing with great rapidity. So, too, with the running stream of the Argentina water and some others ; but, though not so dangerous as ordinary well waters, there seems no reason why even such wells should remain open in a city which has the enormous aqueduct supply Rome has. There may be a few other wells more liable to sewage contamination, but it is certain that the water can be seldom the cause of typhoid fever or diphtheria throughout the city, especially in the so-called English quarter.

What is more likely to cause these preventable diseases, is the want of modern sanitary appliances

* I believe this to be mainly the filtration from the Lake of Albano; but it would take up too much space to give the reasons for the belief.

for the exclusion of sewer gas from houses. The sewers in the new quarters, and in some parts of the old where they have been renewed, are of fair construction, but many of the old sewers are in a most dilapidated state, and much time and money are required to rebuild them. The main defect, however, is the want of a great collector on each bank of the Tiber, to receive the sewers and carry the sewage out of Rome before discharging it into the river. As it now is, the sewers in the lower part of the city discharging directly into the Tiber, are dammed back by every flood, and the sewage then finds its way into the subsoil, cellars, and underground areas, where its presence is most noxious. Ventilation of the sewers is effected by the untrapped street man-holes, or by the side openings for surface water, which enters the sewers either directly or from special drains under the trottoirs, and sometimes by rain-water pipes. The house-drains, too, are badly built, usually square-shaped, made of bricks or tufa, unlined with any impermeable cement, never of pipes of glazed earthenware or iron, untrapped and unventilated, except by open man-holes or by rain-water-pipes and soil-pipes, when open above. In the same way, the soil-pipes and the waste and overflow pipes of sinks, baths, and lavatories, which generally open into soil-pipes or drains, are seldom trapped. This is not so formidable a danger in the older part of Rome as elsewhere, owing to the fact of the closets having very often been constructed on balconies outside the houses; but it must tend to increase the risk where the water-closet system has been introduced, and where the closets, provided with old-fashioned untrapped pan basins, and having, from parsimony, an often insufficient water supply, are found opening into courts, so narrow that they can only be called wells, thus making their ventilation difficult or impossible. In this respect, and in the new quarter particularly, the danger would seem to be rather on the increase, Italian architects and builders being as indifferent to all the modern sanitary appliances for preventing the contamination by sewer emanations of the air we breathe in our dwellings as were our own some fifteen or twenty years ago. There are, I am told, some cesspits still in Rome, but they must be confined to a few isolated quarters.

The disease which, perhaps, next to typhoid fever, points most clearly to the sanitary state of a city, is diphtheria, but the method adopted by the Registration Office of returning the deaths, combining them with croup, presents an insuperable obstacle to their discrimination. In the five years, 1875-79, there were 1476 such combined deaths, a large item, varying little, however, from year to year, either as to the number or age, more than three out of every four deaths being those of children under five.

Measles and scarlet fever, on the other hand, are usually very mild maladies here, not causing the same havoc among the young as they do in Great Britain. In the quinquennium given, 386 deaths are ascribed to measles, 187 to scarlet fever, the latter being particularly mild. A whole year sometimes passes without scarlatina being entered as the cause of a single death. I myself have only attended one case in nine years. Whooping-cough, too, is much less deadly, but small-pox, on the contrary, is often epidemic and is very fatal. Nothing so severe as the great epidemic of 1871, 1872, and the first half of 1873, occurred in the five years for which the returns may be looked on as trustworthy. In that epidemic there were 1219 deaths from small-pox in Rome*. In the quinquennium 1875-79 it was the cause of 885 deaths, the lion's share falling to 1876, when 594 deaths occurred, while in 1878 there were only seven, and in 1879 none. It became again epidemic about the middle of April 1880, and, when the epidemic ceased about the end of May of this year, 641 persons had died from it. Such epidemics at intervals of four or five years are, indeed, inevitable in Italy, as proof of vaccination is only required when children enter schools or other public institutions, which naturally leaves a large residue of the very young as unvaccinated food for small-pox. Hence in every 100 deaths there are from sixty to seventy children under five years of age, and as many as eighty-five out of the 100 are those of the unvaccinated.† What is true of Rome holds good for every part of Italy. Facilities are, it is true, offered for gratuitous vaccination, a small sum even being paid in Rome to the parents who bring back their children to show that the lymph has taken, but such measures are only trifling with a disease which admits no compromise, and there is no hope that the small-pox mortality will be reduced in any part of the kingdom as long as the present deplorable indifference to the value of thorough protection by a proper compulsory Vaccination Act exists among Italian legislators.

It is impossible to compare the general zymotic mortality of Rome with that of any fairly healthy city such as London or Edinburgh, as the calculations are not made for the same diseases, but it is certain that that of Rome would be materially higher. It is also unnecessary to dwell upon other diseases of this class, though it may be added that deaths from pyæmia and septicæmia are numerous in the hospitals, as the buildings are old, and do not present the sanitary requirements surgeons now consider essential.

Neither fever, nor small-pox, nor any other contagious disease, however, is so fatal to the Romans as the keen wind from the snow-clad Apennines in the winter months. The Tramontano is much more deadly than the Malaria. In four out of the five years for which I have returns (1875-78 inclusive), the deaths from pneumonia, bronchitis, and pleurisy, were 6,119 out of 35,844, or more than one out of every six, and those were years in which the mean temperature was rather above, the mean number of days of north wind rather under the average, as ascertained for long periods of observation. From the beginning of December 1879 to the end of March 1880, pneumonia, pleurisy, and bronchitis killed 1718 persons, that is, in an excessively cold winter for Rome, there died in four months many more than the total number of people who usually die in a year from the complaints mentioned. The lower classes among the Romans are, indeed, quite unable to resist the effects of cold. Insufficiently clad, underfed, without the means of ventilating or heating their wretched dwellings, and with constitutions often undermined by malaria, they fall before a biting north wind in relatively even larger numbers than the same classes in London before the thickest and most prolonged of winter fogs. Such facts as those, showing the fatality of acute lung complaints in colder years among the poorer inhabitants, make it clear that a diminished death-rate in Rome will depend more upon favourable climatic conditions than upon other causes.

* *L'epidemia de Vajuolo in Roma*, 1871-73. Prof. D. Toscani.

† The classes are divided too sharply into vaccinated and unvaccinated, none being put down as uncertain.

In close correspondence with what has just been stated, the deaths from Phthisis Pulmonalis are by no means insignificant items in the returns. Consumption, in the popular sense, killed in the two years 1877, 1878, in which it was separated from other tubercular diseases, 1,489 persons, or one out of every eleven deaths from all causes, was due to it, somewhat fewer, it is true, than in our larger cities.

Very few of the other diseases require particular notice. Organic diseases of the heart are fatal in about the same proportion as in England. Apoplexy is thought to be a common cause of death in Rome, and the returns make it so, but as almost every very sudden death here is put down to apoplexy whether there is a *post mortem* examination or not, it is necessary to be cautious in accepting the figures. When no examination has been made, at least, instantaneous deaths are more usually ascribed with us to heart disease or aneurism, than to hæmorrhage or to rupture, to embolism or aneurism, in the more vital parts of the brain.

Diseases of the liver, Bright's disease, diabetes, and alcoholic excesses are certainly much less frequent causes of death in Rome than in Great Britain. Suicides are quite as common, and homicides much more so than in our larger cities.

The most deadly season is the winter, then spring, next autumn, and finally summer, which is considerably more healthy than the others.

The mortality of infants and young children is more marked even than in England, rather more than forty-four out of a hundred persons dying being under five years of age. The death-rate in the Brefotrofio, or Foundling Hospital, is one of the most startling of the many startling features in the Roman returns.

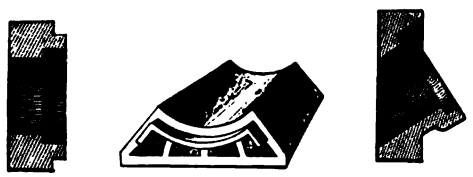
A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

VII.

LAMBETH HOUSE DRAINAGE, DRAINAGE SUNDRIES, STONEWARE SINKS, AIR-BRICKS, DAMP-PROOF COURSES, ETC.

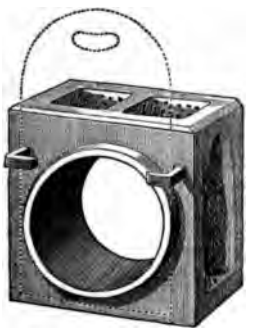
BEFORE proceeding to notice the many important productions by Messrs. Doulton bearing especial reference to water-supply, such as water-waste preventers, supply-valves, and the like, I find it necessary to refer to various miscellaneous articles which are used in conjunction with house drainage in town and country. Among these may be noticed the Doulton inverts and junction blocks, which have, since their



Doulton's Patent Inverts and Junction Blocks.

introduction into the sanitary market, played a very useful part in the case of large drains, or sewers built up of brickwork. These invert blocks proved a complete cure for the necessarily rough bottoms of drains and sewers constructed of bricks, and being of imperishable material, not liable to warp, perfectly even, and, moreover, glazed on the surface, a drain thus constructed will carry the sewage away in the cleanliest fashion. In remote country districts, and abroad, where the freight and cartage of large glazed pipes would prove almost out of question in point of expense, it can be readily comprehended how important these articles become, seeing that by their adoption a perfect brick drain can be got, having nearly all the advantages of a glazed earthenware pipe. The junction blocks, shown in the above cut, to the right and left of the invert, are also of incalculable service in making a secure and proper connection between tributary pipe drains of smaller size and the brick sewer. They are made to correspond in shape and thickness with the internal figure of the sewer, and are produced of all sizes and thicknesses, as a glance at a separate sheet of Messrs. Doulton's catalogue will show.

It is found very advantageous at times, when the drain is a long one, to pent up the water-carried



Doulton's Flushing Block.

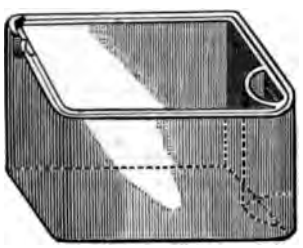
sewage, etc., especially in times of rain, and then to liberate the whole, by way of flushing out the drain to the outfall. This is usually done in clumsy fashion by means of a wooden apparatus, which, since the introduction of the above flushing block, ought to be now altogether obsolete. The block for this purpose, made by Messrs. Doulton, is of earthenware, and has a vertical ground face, which forms, when the slide is let down between the guide pieces, a joint, which is water-tight for all practical purposes. The adoption of this flushing block cannot be too highly recommended, as it is at once serviceable and economical. I also figure the balance valve, for the

Doulton's Latham Balance Valve.

ends of drains, devised by Mr. Baldwin Latham, C.E., the flap of which can be balanced to any degree by merely screwing in or out the weighted spindle fixed in the centre.

The prevention of grease-collecting in a drain is

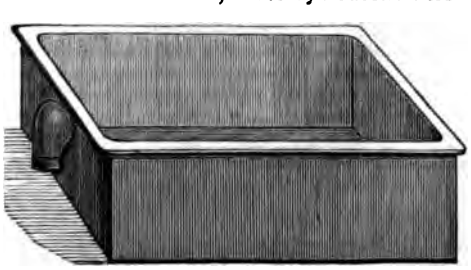
he utmost importance, as the congelation of fatty ter in the drain stops it up in a very short time, necessitates cleaning out the pipes with rods, if altogether taking them up and relaying. Many trivances have been devised for the collection of lery grease, and it is customary to build fat re- tacles of brickwork, the outgo pipe being curved allowed to dip into the water; the fat being made ollect in the grease chamber, between the bottom his bent down outlet and the entrance level of the waste inlet. These brick-built grease chambers however, costly to build, and would prove quite of place outside a small cottage, for example, and, eover, they are not so cleanly as collectors made toneware. Hence Messrs. Doulton have intro- ed to notice a grease interceptor of stoneware,



Doulton's Improved Grease Interceptor.

h is applicable to mansion or cottage alike. It sists of a reservoir, made in two sizes, 12 and 22 ons capacity respectively, through which all the water is made to pass before entering the drain. waste water enters at one corner at the top, e the outlet is at the farthest possible point, and urrounded by a dip pipe, thus giving the fatty ter plenty of time to collect in the chamber by process of cooling. The covering of this fat rceptor is left to the client, who may provide one inc, iron, wood, or stone, as he may see fit. It nportant, of course, that it be frequently cleaned and that no extraneous matter be thrown into it. great advantage which it possesses is, that it can ttached to the sink, and to the drain, in an easily ovable fashion, and thus become a tenant's ire.

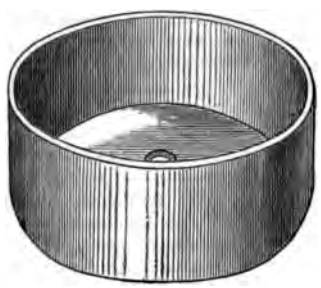
With regard to the sinks themselves, everyone ws that although lead-lined sinks are valuable, cially where delicate china and glass are washed, nevertheless leaden sinks are apt to prove a ance in some places, and, moreover, accumulate e, crack along the bottom in time, and require ning. It is, however, now possible to obtain sinks ufactured of stoneware, and very great is the n to the house and to public institutions of every l. The usual remark, made by householders who



Doulton's Butler's Sink. No. 41.

reason to object to lead-lined sinks for house- ds, and nursery and scullery uses particularly, is, that they do not know where to obtain suitable cleanly stoneware sinks. This need be no longer said, for strong vitrified stoneware sinks for kitchen, scullery, and upstairs use, in all sizes, can be seen at Messrs. Doulton's. They can also be had in all sizes, from 17 inches by 13 inches and 3 inches deep, parallelogram-shaped, to 42 inches by 24 inches and 5 inches deep, which is sufficient variety, one would think, for all purposes. These sinks are also made angular in shape, to fit corners, which is a great additional advantage to builders of houses. The sink, which is illustrated above, is intended for the use of the butler's pantry, and still-room, etc., and is manufactured in the ordinary colour or in white, in two sizes, viz., 25 inches by 16 inches and 10 inches in depth outside, and 22 inches by 15 inches with a depth outside of 8½ inches.

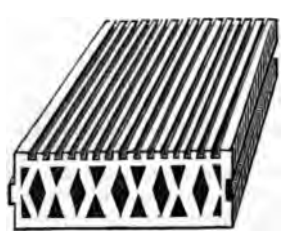
Nor is the poorest cottager forgotten to be cared for, as Messrs. Doulton have provided for her a wash-tub of similar cleanly ware, in sizes suitable to the



Doulton's No. 60 Vitrified Stoneware Wash-Tub.

exigencies of the home laundry. Fixed on a suitable stand, and having an outlet to which a small hose can be attached, it is, beyond all comparison, preferable to the wooden washing receptacle.

Among the miscellaneous goods which it positively behoves me to notice—inasmuch as, though not striking in character, they are nevertheless of immense importance—is the improved damp-proof course, manufactured at the Lambeth works. This is, perhaps, the most completely provided for appliance of the kind, and many have been the changes



Doulton's Improved Damp-Proof Course.

in the patterns of these goods since their introduction in 1859. Being made of vitreous stoneware, no damp can rise up the wall when a course of this has been laid down just above ground floor line. The open channellings in the depth of the damp proof tile also provide for a continuous ventilation underneath the floor, and thus prevents dry rot in the carpentry work, and removes the deleterious ground air as fast as it rises.

Last, but not least, in my miscellany of sanitary goods, comes the universal air brick. This adjunct of sanitation is, however, much abused, being put, for instance, in iron, where it speedily scales to pieces,

or oxidises, and leaves a rusty trail on the wall below it. I need not say that these air bricks from Lambeth

Air Brick.

are of stoneware or terra cotta, well-pierced, and even-faced without warps. They range in superficial area from 27 to 108 inches.

ON COOKERY CLASSES IN NATIONAL SCHOOLS.

By The Rev. Edward Burbridge.

There is a very general agreement amongst those who are interested in education, that a certain amount of *practical* teaching is desirable. Hitherto this has been mainly restricted to the teaching of needlework. It has been supposed that the teaching of practical cookery would be impossible, except at a great cost, and that it would interfere with the general work of the school. Various School Boards, as in London and Leeds, have made the attempt at a considerable outlay, and with varying success. But voluntary schools have been afraid to follow the example, the managers being unwilling to add to their own or their teachers' burdens. At the same time, the subject approves itself to the minds of a large number of school managers, who regard an improvement in the homes of the labouring population the surest way to attack the national evil of intemperance. The following account of a successful scheme of cookery instruction in the schools of a country district, will serve, we hope, to dispel some of the above mentioned fears, and to encourage the extension of the movement in the many districts, both in towns and country, where an active interest is taken in the well-being of the population.

After a meeting of school managers and teachers, and an address from Mr. Buckmaster of the Science and Art Department, on the practical usefulness of such instruction and the practical ways of giving it; it was decided that a committee of school managers, clerical and lay, assisted by some ladies, should be appointed to make arrangements for carrying out some scheme of practical cookery instruction for the schools of the deanery. After much inquiry, a qualified teacher was engaged for a course of three months' instruction. The schools desirous of joining in the scheme were assisted from a general fund (amounting to a total of about £30 raised in the neighbourhood) to provide necessary utensils, and to fit up a room for the lessons.* Six parishes opened such kitchens. The classes were held once a week, and were formed out of the first class of girls in the day school, with a few older girls still living at home. The cost of utensils was £4 10s.; those who had no suitable cooking-range had also to provide one.† The cost of materials, firing, assistant to clean up and sell the food, and rent of room, for thirteen lessons amounted to about £1 10s. Each school contributed £1 towards teacher's salary, the remainder being paid out of the general fund. Various places were utilised as kitchens,—an empty cottage, class room, a parish room, a workman's reading-room,—and moveable tables on trestles, and a cupboard for the utensils and stores completed the arrangements.

In starting such schemes of instruction it should be understood that the sanction of the Education Department, and the approval of H. M. Inspector are necessary, in order that the attendances at the cookery lessons may count as ordinary school attendances; and the attendances must be carefully registered for entry into the school registers. The one thing necessary with respect to the method of instruction is, that it should be adapted to the capacities of children. Therefore the list of lessons should be simple. Note books should be insisted on, and the lessons should be brought nicely copied out in a clean book the next time.*

A mingling of demonstration and practice in each lesson is recommended, having been found thoroughly successful. A dish was first prepared by the teacher, the scholars taking notes. This done, the scholars themselves came to the tables, and set to work in pairs to prepare and cook the same dish. If more than twelve scholars are present, the remainder must by turn sit still watching the others and learning their notes. Large classes are not recommended. Questions must continually be repeated both orally and in writing, to keep up the knowledge of the scholars and to ensure their understanding the reasons of the various processes. The cleaning of utensils and the laying of a fire must not be forgotten.

In cases where expense is of no importance, a kitchen fitted up on purpose, with several fireplaces, would be very desirable, but experience has proved that much good teaching may be done with the simplest arrangements; and in every case, it is highly important that the course should be confined to the simple principles of cookery. Anything beyond these is unsuitable for children's fingers and brains. It may be added that the above scheme has been in operation for two years; and the interest taken in the classes has been found to increase, as their practical usefulness has been proved by experience.

THE SCIENCE AND ART OF SANITARY PLUMBING.

Abstract of Lectures delivered for

THE NATIONAL HEALTH SOCIETY,

By S. Stevens Hellyer, Esq.,

At the Society of Arts.

V.—House-Drainage.†

Mr. Hellyer said he proposed to deal with the question of house-drainage in the present lecture, and to postpone the subject of ventilation to the last evening of the course, substituting a lecture on that subject for the one announced on 'The Art of Lead-Laying', which lecture he proposed to drop entirely out of the course. In commencing the internal plumbing of a house, plumbers generally began with

* Full particulars of all things necessary will be found in a little book describing this scheme, *Cookery Classes in National Schools*, published by Simpkin and Marshall, price 1s.

† Nothing is better than a small cottage open range, which, with fixing, costs about £2 to £3.

* The co-operation of the school-mistress should be gained by consulting her in all details, and by a judicious after arrangement of a few prizes and grants.

† For reports of the previous lectures, see The Sanitary Record for June 15 and July 15, 1881.

soil-pipes, but before they could get such pipes ready for fixing they required to know the kind of water-closets to be fixed upon them, so as to arrange the branches and traps accordingly. Privies served their purpose well enough when every man had a garden or piece of ground; but when men congregated together in cities and towns, remote places for putting such conveniences could not be found, and drains and sewers had to be made into which the general slops of the house were thrown.

According to the Records of the Patent Office, in the year 1775, Alexander Cumming, a watchmaker, in Bond Street, took out the first patent for a water-closet, than which many water-closets in use at the present day are more insanitary. The trap under Cumming's closet is shown by the drawing attached to the specification of the patent to have been a 'round-pipe' or syphon trap. Two years later (*i.e.* in 1777) Lemuel Prosser, a plumber living in the parish of St. Martin-in-the-Fields, took out a patent for what he describes in his specification as 'a water-closet upon an entirely new construction, which will always remain free from any offensive smell.' In spite of its inventor's claim, however, Mr. Hellyer thought that Prosser's closet was about as bad as the pan-closet, in being a closet which would never be entirely free from an offensive smell. In 1778 Joseph Bramah, of Cross Court, Carnaby Market, Middlesex, cabinet-maker, took out a patent for his invention of the now well-known valve-closet, which has since its inventor's time been improved in many points. But the difficulty of getting the 'slider' of Cumming's closet, and the cranked metal valve of Bramah's, to always seat themselves so as to keep their basins fully charged with water, and to stand rough usage, led to the introduction of the pan-closet. William Law, a founder in Soho, made certain improvements in pan-closets in 1796; but such closets were not much used, though other improvements were made in them, before the early part of the present century. In 1826 William Downe, senior, of Exeter, also a founder, made further improvements in the pan-closet, reducing the size of the 'container'.

One reason why the pan-closet had had a larger sale, and been more extensively used than any other closet, was that there were no valves about it, apart from its supply, to get out of order. It would also stand rough usage, when well made, better than any other closet of its kind, but, on the other hand, it was the most insanitary water-closet that the lecturer knew of, and ought never to be used. He was free to condemn it, for though nearly every water-closet maker made it, it belonged to nobody in particular. He was bound to admit that his own firm made them, for people would have them; but he never allowed one to be made if they could help it. His firm had porcelain-enamelled the interior of the container part years ago, and they had made that part in white ware; but, no matter of what material, the pan-closet could never be made a wholesome one. Great care should be taken in selecting self-cleansing water-closets. No closet should be fixed which would not allow a flush of water of two, three, or four gallons to cleanse every part of it which could become fouled by usage. The less surface there was in a closet or trap, the better it could be cleansed, and unless such fittings were thoroughly cleansed after each usage they were sure to become unwholesome. He did not intend to point to any man's make in closets, nor would he bring his own before the meeting, for when self-interest came between a man's eye and any object, it interfered with its true proportion. All that he asked for was, that no water-closet should be fixed which would not allow itself to be thoroughly cleansed, and its trap to be washed out, every time it was used.

Passing to the subject of soil-pipes, the lecturer thought that lead was the best material for them, especially for this climate. The only material that at all came into competition with lead for soil-pipes was cast-iron, but he gave lead the preference, because it was more durable, more compact, and more wholesome. He did not pronounce for lead because of any fear that if cast-iron soil-pipes got into general use, it would injure the plumbing trade, for if the plumber could fix lead soil-pipe, which required the greater skill, on account of its 'purpose-made' bends and wiped soldered joints, he could certainly fix cast-iron soil-pipe, which required the lesser skill, for the bends and socket branches in the latter case would be cast for him, and ready to hand; while as to the jointings, he would have no difficulty whatever in making them, whether (as in the case of light iron pipe) they were made with spun-yarn and red-lead, or in 'cement,' or whether the joints were caulked with lead, as they should be when the strength of the iron pipe would admit of it. No cast-iron soil or waste-pipe that would not admit of the joints being made of lead and well caulked should be fixed inside a house. Where plumbers were not skilled in pipe-bending and joint-wiping, it might be preferable to use cast-iron soil-pipe. Cast-iron certainly had the advantage over lead that a carpenter could not drive a nail, bradawl, or gimlet, into it, and when a soil-pipe was fixed inside a house it was worth something to the occupant to know that. Then, again, when the waste-pipes from baths and sinks were taken into a soil-pipe, as in the United States, it was better to use cast-iron, for the action of hot water upon thin lead soil-pipes was very injurious, unless slip-joints were used to allow for expansion and contraction; but, of course, it would not do to fix soil-pipes or waste-pipes with slip-joints inside a house.

As to the size of soil-pipes, fifteen or twenty years ago it was common for plumbers to fix (under the direction of a specification) a 6-in. soil-pipe when it had to take the branches of four or five water-closets; and, with many of the architects and builders, as well as the plumbers, of to-day, 5-in. and 4½-in. were the general sizes, even where there was only one water-closet. Now, as it was of the utmost importance that a soil-pipe should be efficiently flushed out with water every time a water-closet upon it was used, it was evident that the smaller the size of the pipe the more efficiently would it be flushed, and as it was not wanted for a coal-shoot or a dust-shaft, the lecturer could not see why it should be so much larger than the outlet way of the water-closet into it. In private houses, where the water-closets would be used with greater care than in public buildings, he considered a 3½-in. lead soil-pipe quite large enough to take a tier of three water-closets. (He was supposing the soil-pipe to be ventilated at top and bottom, and each trap to be ventilated as well.) He considered that a 4-in. soil-pipe, when of lead, and made by hydraulic pressure, was large enough to take the branches from several more water-closets, and that a 4½-in. soil-pipe was ample to take a tier of six double closets. He had had 3½-in. lead soil-pipes fixed to take tiers of three water-closets, and he had never known the smallest inconvenience to arise from that arrangement, while the pipes were found to keep cleaner than 4-in. soil-pipes near them. As to the position of soil-pipes, whether they should be outside or inside a building, he gave his voice in favour of outside.

There was no danger of the stoppage of a soil-pipe by frost if there were no leaky closet-valves to let the water trickle into the pipe. The effect of frosty weather upon outside soil-pipes was not so damaging as the action of the sun upon them when they were fixed in certain positions, for they were often exposed to the direct rays of the sun for many hours together, the effect being to stretch the pipe between the 'tacks,' and such stretching would go on from year to year, bending the pipe out of its true vertical line, and perhaps breaking it. Where slip-joints could be used such lead pipes (when properly ventilated to prevent the action of gases upon them) would last for centuries; but where the joints must be soldered, the pipes should be placed in an angle or recess where they would be screened from the rays of the summer sun.

In conclusion, Mr. Hellyer treated at great length on the ventilation and fixing of soil and waste-pipes, and of their proper disconnection from drains. He urged that to get good water flushes through waste-pipes from sinks and lavatories, the inlets into such wastes should be as large as, if not rather larger than, the bore of the pipes, so as to get an efficient flush. Where the inlet into a waste-pipe was of smaller bore than the pipe itself, the latter could not possibly be efficiently flushed.

The Chairman of the meeting, Mr. Rogers Field, C.E., agreed with almost everything Mr. Hellyer had said, particularly as to the small risk of danger to outside soil-pipes from frost. During the severe winter of 1878-79, in only one case out of a large number of instances in which open soil-pipes had been fixed under his superintendence, did freezing take place, and that was found to be owing to a leaky closet valve.

In the discussion which ensued, Mr. Pullen contended that the D-trap was a much better trap than the round-pipe or syphon trap; and, notwithstanding what Mr. Hellyer had said in a previous lecture to the contrary, that it was a self-cleansing trap. Mr. Davies also defended the D-trap, remarking that Bramah, so far from discarding it, used it under his valve closet. Mr. Gosling reproached the lecturer with inconsistency in making and supplying pan-closets when he condemned them, when Mr. Hellyer asked what was a man to do when, having taken the contract for the plumbing work and sanitary fittings in a large building, he was told, after a great part of the work was done, that pan-closets must be substituted for those originally intended to be used? He could only comply with the order, though protesting against the want of sanitary knowledge on the part of those who preferred such unwholesome appliances.

The system employed at the Hôpital de la Pitié, in Paris, for disinfecting sewer gas by means of nitrous oxide, is described in *La Nature* for May 21. The gas passes into an earthenware cylinder about four feet in height, filled with charcoal sprinkled with nitro-sulphuric acid. The moisture contained in the gas condenses on the charcoal, setting free the nitrous oxide contained in the nitro-sulphuric acid, which destroys the sulphuretted hydrogen and all deleterious matters. It is suggested that possibly this system may prove to be the solution of the sewage problem.

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ON THE IMPURITIES OF WATER, AND THEIR INFLUENCE UPON ITS DOMESTIC UTILITY.

By G. Stillingfleet Johnson, M.R.C.S., F.C.S.

The lecturer began his subject by making mention of the existence of organic impurities in natural waters, and announcing his intention not to dwell upon this part of the subject, but to confine himself to the discussion of the inorganic impurities in water. These impurities, solid or gaseous, are derived from the earth or air with which the water has been in contact, and are incorporated with it by virtue of its solvent property. Some experiments were then shown, illustrating the nature of solution, the difference between soluble and insoluble matter, and the influence of temperature in modifying the solubility of (1) gases and (2) solids in a liquid solvent, such as water. Attention was next drawn to the remarkable increase in its solvent action, which is often conferred upon water by the presence therein of solids or gases which it has previously dissolved. Experiments were shown to illustrate this point also, and it was remarked that when a solid in solution increased the solubility of another solid, the former was generally a substance much more soluble in pure water than the latter.

Having discussed some of the circumstances which increase the solvent action of water, the lecturer next drew the attention of his audience to some of the conditions which tend to retard or even completely arrest that action: notably the formation of insoluble fibrins upon the surface of soluble bodies. This part of the subject was also explained and illustrated by experiments. Passing on to the enumeration of the impurities of most frequent occurrence in natural waters, the gases were first mentioned, and shown to be identical with those found in the atmosphere, if we except certain rare mineral waters which contain sulphuretted hydrogen, etc.

Though identical with the atmospheric gases in quality, the relative quantity or proportion in which these germs are found in the aërial and aqueous oceans was shown to be extremely diverse. This fact is explained chiefly by the relative solubilities of the respective gases. Thus ammonia is so soluble in water, as to be hardly perceptible in air after a long-continued fall of rain; whilst carbonic acid gas, which is much less soluble, is invariably present, even in the purest mountain air, in appreciable quantity. Carbonic acid, however, being much more soluble in water than oxygen and nitrogen, is found in that liquid in larger quantities than the latter gases, especially in the case of spring-water, which, in its terrestrial wanderings comes in contact with subterranean accumulations of carbonic acid gas. Oxygen again, being more soluble in water than nitrogen, is usually present in that solvent in larger quantities than the latter gas, and this important to the life of fish. The influence of dissolved gases in water was shown to be in the main beneficial. Thus distilled water is mawkish and insipid, whilst, if aërated by charcoal, which restores the gases it had lost, it becomes again palatable. The influence of dissolved gases in water upon its solvent action for solids, notably for carbonate of lime, was next alluded to.

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* Read before the Society of Arts, April 28th, 1881.

The solubility of freshly precipitated carbonate of lime in a solution of carbonic acid gas in water was demonstrated; and the frequent occurrence of dissolved carbonate of lime in natural waters explained by the action upon calcareous soils, rocks, etc., of water charged with carbonic acid gas. The effect of expelling the dissolved gas from a carbonated calcareous water, by heat or otherwise, was also demonstrated, and the formation of stalactites explained.

The difference between temporary and permanent hardness was next discussed, and the method of removing the former by boiling the water, and so expelling the carbonic acid gas and precipitating the carbonate of lime explained. This method of softening waters, however, was shown to be objectionable, involving, as it does, waste of fuel, expulsion of the gases, and liability to furs or deposits upon kettles, boiler incrustations, and occasionally explosions. These evils may all be avoided by the use of Dr. Clark's process, which was then explained. By this process, the waste of soap in washing occasioned by hard waters is avoided, and the water is also palatable, since only the carbonic acid gas is removed from it, not the oxygen, and safer than before for dietetic purposes, since the precipitated lime acts as a mordant, and removes dissolved organic impurities, if any previously existed in the water. Finally, the action of various waters upon lead was pointed out.

It was shown that water containing dissolved carbonates and sulphates may safely be stored in lead, since the metal is protected from the solvent action of dissolved oxygen gas in water by the formation upon its surface of an insoluble film of sulphate and carbonate of lead; and the importance of not removing this film by violent cleansing operations, etc., was dwelt upon. On the other hand, rain water, and soft waters generally, if kept in contact with lead, are sure to dissolve the metal in considerable quantity, as also are waters holding in solution nitrates and chlorides, the salts of lead with those acids being soluble. In conclusion, the lecturer hinted at the beneficial, rather than injurious, action of most of the natural impurities in water where present in solution in moderate quantity.

A new park for the borough of Halifax has lately been opened. It is called Shroggs Park, is on the north side of the town, and has an area of about 25 acres. The site has been generously leased to the Corporation for 999 years by Mr. Henry Savile, of Rufford Abbey, at a nominal rent, and part of the expense of formation has been borne by Mr. Edward Akroyd, formerly M.P. for Halifax. The park contains large foot-ball and cricket grounds, a central pavilion, drinking and ornamental fountains, a fine waterfall, etc. About 60,000 trees and shrubs have been planted.

At an examination held by the Sanitary Institute of Great Britain on June the 2nd and 3rd, six candidates presented themselves, and the Institute's certificate of competency as local surveyor was awarded to Samuel S. Grimley, and to Arthur Whitcombe, and the Institute's certificate of competency as Inspector of Nuisances was awarded to John James Cowderoy, to Joseph Rains, and to William Wilkinson.

James E. and Samuel Spencer (agents for John Spencer, the Tube Works, West Bromwich), 3, Queen Street Place, Cannon Street, E.C., have gained a gold medal for their anti-corrodo tubes and fittings, coated by Barff's rustless process, at the Melbourne Exhibition; this is in addition to the juror's award of the First Order of Merit, and is the only gold medal awarded for tubes.

THE

SANITARY RECORD.

AUGUST 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

A PLUMBING INSPECTION LAW.

ONE of the most sensible things hitherto arranged in sanitary matters, is the passing of a law, taking effect in March 1882, and applicable to New York and Brooklyn, whereby is secured the registration of plumbers, and the supervision of plumbing and drainage generally. By the details of the bill we gather that, under such regulations as the Board of Health Department shall prescribe, every master or journeyman plumber shall, after that date, register his name and address at the Health Department of the city, and after that date, also, it shall not be lawful for any person to carry on the trade of plumbing, unless he be duly registered. A list, also, of the registered plumbers of New York is to be published in the City record once a year.

For the future, therefore, it will not be possible for any builder to erect in these cities any building, the plan of which has not been previously approved by the Board of Health. Suitable drawings also have to be submitted and deposited of everything which relates to the plumbing and drainage of the house, and in order to meet the extra expense incurred by the Health Department in carrying out this law, the sum of 6,000 dollars is apportioned to that Department for the present year. Furthermore, upon the affidavit of a Commissioner of Health, any Justice shall have power, after the service of a notice, to restrain, by an injunction order, any further progress of the building until the law is satisfied; and the violation of any of the provisions of this Act is to be considered as a misdemeanour.

This law has not been passed a day too soon, as testified by many bitter reflections made by sufferers in the public press. Tinmen, bricklayers, gas inspectors, book-keepers, and even shoemakers, have been acting in the capacity of plumbers, with sad results to public health. The general conviction of the public was, that some stringent law was necessary, in order to restrain bad workmanship, and everyone is satisfied that the present law will work satisfactorily, and that it ought to be adopted in both cities. It does not appear whether the rules in the two cities are alike, or whether the men registered in either city may do work in both, or whether they should register in both cities, but doubtless these details will be speedily arranged. It would be wise if each legislative body in the States would pass a

similar law, and free themselves from the grasp of incompetent workmen.

With us in England the apprenticeship system obtains, and although it cannot be said to be a miserable failure, and must be acknowledged to act in a superior manner to that system in America, owing to its improved traditions of long-descended practice, it is questionable whether it would not be advisable to engraft this new licence system here.

The only approach which we have to anything like registration is that of a plan collection; it being incumbent on our London vestries to have lodged with them copies of the drainage plans of new houses, and also of old houses which have to be re-drained, without which the surveyors will not make any junction with the sewer. For some time back, therefore, it is possible to obtain copies of the basement plans of houses lately drained, as far as an indexed basement plan is concerned. In some cases, however, after leave has been obtained, the internal arrangements of the drains have been altered, and thus the vestry copies will not be very accurate.

But there is one thing on which we can pride ourselves, it is, that upon application to the surveyor's office of any parish, a perfect set of plans can be consulted by anyone, without payment, showing the exact line of sewers and depth of same at divers places, and it is questionable whether any city in the world could show so perfect a system of registration. Now the question is forced upon us by the action of our New York *confrères*, whether we shall follow suit in the bold lead which they have given us, and proceed to agitate for registered plumbers to begin with, as being the most important factors in the economy of house-drainage. What is our Honourable Guild of Plumbers doing; would not this movement be quite within their jurisdiction, and even the attempt at its achievement be a credit to them?

NOTES OF THE MONTH.

THE PROGRESS OF SANITARY SCIENCE.

It is a matter for great satisfaction that sanitary science has been recognised by the Royal University of Ireland, and is introduced into the new scheme adopted by the Senate. The subjects required for a diploma are of wide extent, as will be seen from the following programme:—Climate—A general knowledge of meteorological conditions; the reading and correction of instruments, and tabulating the results of meteorological observations. Chemistry—Constitution of the atmosphere; pure and impure waters; food. Geology—The character and structure of rocks, with reference to water-supply and drainage. Physics—Laws of heat, mechanics, pneumatics, hydrostatics, and hydraulics, or sanitary engineering; the construction of dwellings, barracks, hospitals, schools, factories, etc., in accordance with the principles of warming, ventilation, drainage, water-supply, etc. Vital statistics—Hygiene, including the causation and prevention of disease. Sanitary law. The examination in chemistry shall include a practical part on the chemical and microscopical examination of air, water, food, poisonous substances used in manufactures, etc. The examination in physics shall embrace the reading of plans, section, scales, etc., in connection with buildings. Perhaps when the importance of these subjects comes to be recognised among the alumni of the Irish University, there may be some chance for the improvement of the sanitary condition of Dublin and a corresponding reduction in its death-rate.

IMPROVEMENT OF ARTISANS' DWELLINGS AT YORK.

On the 21st ultimo, a conference was held in the council chamber of the Guildhall, York, to consider the best means of supplying the alleged scarcity of artisans' dwellings in that city, at which the Lord Mayor presided. Mr. Councillor Empson strongly advocated the erection of dwellings on the block system, which as a rule had so satisfactorily answered their purpose in London, Newcastle, and elsewhere. He was supported by Mr. C. Ernest, who gave a gratifying account of his visit to the industrial dwellings at Newcastle. Mr. S. W. North, Medical Officer of Health, objected on the score of health, to the erection of huge blocks of buildings as those described, as in exact proportion as they increased per square mile, they increased the mortality. Even in high-storied hospitals the mortality was greater than in those differently arranged, and the erection of these blocks was only justifiable on the ground of necessity. This view of the case is, however, controverted in the most satisfactory manner by the recent report of the Industrial Dwellings Co., which shows a death-rate of only 16.7 per 1,000 throughout their blocks of buildings.

THE RE-VACCINATION OF ADULTS.

At a recent meeting of the Wrexham Board of Guardians, a letter was read from Dr. Maclagan, Medical Officer of Health to the Wrexham Union Rural Sanitary District, drawing attention to the fact, that small-pox, which had been so prevalent in London and other large towns, had appeared at Newton, in their district. Dr. Maclagan strongly urged the desirability of the re-vaccination of adults, and suggested that Guardians should offer their Medical Officers some remuneration for successful cases of re-vaccination. He felt certain that the expense thus incurred, would fall far short of that which the Union might be called upon to pay if no such preventive measures were adopted. He also felt certain the Local Government Board would sanction such payments if applied to. The Board resolved to apply for leave to employ and pay their Medical Officers to re-vaccinate adults.

LONDON SMELLS.

Dr. Domett Stone proposed in the *Times* that chloride of lead should be used as a disinfectant, and might be made by mixing chloride of lime with a solution of acetate of lead. Dr. Carpenter wrote objecting that chloride of lead is by no means a soluble salt, and could act as a disinfectant only by being slowly decomposed and giving off chlorine. He admits that it will absorb sulphur gases, and thus remove the offensive smell made from sulphuretted hydrogen. It is somewhat singular that Dr. Carpenter overlooks the germicide power of Burnett's Fluid (chloride of zinc), which destroys bacteria and all the known forms of infusorial life, without being decomposed and giving off chlorine. It also stays for some time the decomposition of animal and vegetable substances,

when used of a proper strength. Chloride of lead acts in a similar way to Burnett's fluid. The term disinfectant is used in so many different ways and applied to so many substances, that it is much to be regretted that it is not restricted to germicides, or agents having the power to destroy what is known as 'microscopic life'. The dangerous practice of throwing fish offal, lobster shells, and other house and vegetable refuse into the dust bin has also been referred to, and the injury to health, which often results from this practice, pointed out. To remedy this it is not sufficient for mistresses to prohibit servants from throwing these matters into the dust-bin, but the mistress herself or the housekeeper should occasionally look into the dust-bin to see that her orders are carried out. Where dust-bins are not frequently emptied, a suitable disinfectant such as McDougall's, Calvert's, Jeyes', or some other powder containing carbolic, phenic, and other tar acids should be used.

FILTHY STATE OF THE RIVER YARRA.

The report presented to the City Council of Melbourne, at their meeting in May last, shows a most lamentable condition of their river. Above Dwights Falls the river is tolerably pure, but immediately below, at Merri Creek, a very large quantity of drainage comes in from three townships, as well as from the Pentridge prison and Collingwood abattoirs, so that much blood and filth are carried into the stream. On a large piece of ground adjoining the creek there is a large accumulation of offensive offal from the abattoirs which fouls the water, especially after rain. At the mouth of the discharge pipe the 'bubbling and seething of the gases upon the surface of the creek are plainly visible, and the smell is at times most offensive. Nearer the city are numerous wool-washing establishments, tanneries, maize works, and other offensive trades, the whole of which pour their offensive refuse into the river. The whole of the area of Collingwood South, and of Fitzroy, also drains into the river without any disinfection. The effect of all this is, that an offensive stench is given off from the river, which is intensified here and there by dead dogs, etc., caught by the willow branches trailing in the water. Lower down, and within sight of the Government House, are the Richmond abattoirs and wool-washing establishments, which also pour blood and liquid filth into the river. The drainage of the whole city also finds its way into the river, so that an area of upwards of 200 square miles, upwards of 50,000 dwellings, manufactories, and buildings, as well as the special nuisance premises just mentioned, the house and chamber refuse from nearly a quarter of a million people, the discharge from sundry Government water-closets, all pollute the river Yarra, 'which is thereby converted into an open sewer'. The committee to whom this matter was referred, and who have just made their report, recommends that a system of main drainage should be carried out. The power to plan and carry out such a system is vested by law in the Board of Land and Works, and it appears that unfortunately all the works executed by the responsible minister of the Board have been in the wrong direction, and must all be unmade. They therefore recommend that an elective body should be created, with powers and means to remedy these evils. In spite of all these, the prevention of night soil pollution, the removal of cesspools, and the execution of other sanitary works, have already reduced the death-rate considerably, as in 1877 the annual rate was 21.5; in 1878, 19.8; in 1879, 19.5; and in 1880 only 18.2 per 1,000 population. The City Council adopted the recommendations and appointed a deputation to wait upon the Chief Secretary to request him to co-operate with the council in abating these nuisances. Those who remember the filthy state of the Thames before the present main drainage system was made, will sympathise with the inhabitants of Melbourne, and hope the river will soon be in a better state.

SEA-AIR AND INFANTILE DIARRHŒA.

The New York Sea Shore Home has just issued its annual report for 1880. Dr. Edward T. Williams, the physician in charge of the Home for several years, thus sums up his experience:—1. Sea-air is not an infallible cure for infantile diarrhœa. Some cases will die under the best management. 2. The vast majority of cases get well if removed early and properly fed and cared for. 3. After decided collapse and head symptoms come on, death is the rule, recovery the fortunate exception. 4. Bronchial and pulmonary complications are usually aggravated by the cold air. 5. Not a few cases are made worse by exposure in stormy weather, and the cold nights of the last of August and September; and at these times, both fires and extra clothing are needed, and some infants take cold in spite of them. Indeed, it has seemed to Dr. Williams, that the autumnal diarrhœas are chiefly caused by cold, and are unsuited to the seaside.

DISEASES OF SHOP-GIRLS.

In a paper on this subject by Dr. D. E. Chace, read before the Medical Society of the County of Kings, the subject of the diseases of shop-girls was discussed. From a statistical table it appears that in one hundred and fifty cases examined the most frequent trouble was amenorrhœa, then dysmenorrhœa, anæmia, and phthisis. Dr. Chace thought that the long hours of standing had little to do with injuring the health of this class. It was rather the hard work with poor pay and consequent anxiety about living, the poor diet and unhygienic surroundings at home, and the often voluntary disregard of the ordinary hygienic rules, that produced the trouble. It seems doubtful, however, whether Dr. Chace has not made too light of the evil effects of long standing. His statistics were not sufficiently large to contradict the amount of evidence against his view. And though long standing is only one of the evils to which these poor young women are subjected, yet, since it is one that can be remedied without harm to the employer, efforts in that direction should be encouraged.

OPEN SPACES.

Mr. Liddle, in his last report on the sanitary condition of the Whitechapel district, strongly insists on the importance of preserving for the public use open spaces in the metropolis. He most truly states that open spaces for the recreation of children are essentially necessary for their health and well-being, and that unless open air places for amusement and recreation are provided for the children living in the crowded courts of London, their growth will be stunted, and neither their physical nor mental powers will be developed. He further adds that unless more open space is provided for each house which in the future may be built in London, and a prohibition put to the building over the back yards of many of the houses which now exist, and the prevention of houses from being built back to back, it

will be found that, should the population continue to increase in the same ratio as is shown by the recent census, many parts of London will become so unhealthy that the local authorities will be compelled for the public safety to open out the confined localities, and keep them as open spaces.

THE PUBLIC HEALTH
DURING JULY 1881.

THE mean temperature during July, at the Royal Greenwich Observatory, was 65°.4, and 3°.8 above the average July temperature in 100 years. A warm period set in on July 1st, and lasted for five days; it was followed by four cool days. From 10th to 19th the temperature was above the average; 15th, 18th, and 19th being exceptionally hot. During the last eleven days of the month the mean temperature was almost continuously below the average. The mean temperature showed an excess on eighteen of the thirty-one days of the month. Friday, July 15th, was hotter than any previous day on record at the Greenwich Observatory; the mean temperature of the day being 79°.5, and the highest reading in the shade 97°.1. The coldest day of the month was 21st, when the mean fell to 54°.9, which was 7°.7 below the average. Rain was measured at Greenwich on twelve of the thirty-one days of the month to the aggregate amount of 2.1 inches, which was half an inch below the average July rainfall in sixty-one years. The rainfall of the first seven months of this year amounted to 11.6 inches at the Greenwich Observatory, and was only 1.8 inches below the average amount for that period. The sun was above the horizon during 496.8 hours in July, and 211.5 hours of bright sunshine were recorded at Greenwich, which was 59.1 hours above the average amount recorded in the months of July in the four years 1877-80. South-westerly winds prevailed during the greater part of the month.

In twenty of the largest English towns, dealt with in the Registrar-General's weekly return, 20,345 births and 13,521 deaths were registered during the four weeks ending 30th ulto. The births were equal to an annual rate of 34.9 per 1,000 of the aggregate population of the twenty towns, as now estimated by the Registrar-General on the basis of the numbers enumerated in April last; this rate showed a further slight decline from the rates returned in recent months, and was 0.6 below the rate in July 1880. The birth-rate last month did not exceed 28.0 and 28.2 in Norwich and Brighton, whereas it ranged upwards to 37.6 and 39.1 in Salford and Newcastle-upon-Tyne. The rate did not exceed 34.6 in London, and averaged 35.2 in the nineteen large provincial towns.

The annual death-rate in the twenty towns, during the four weeks of July, averaged 23.2 per 1,000 of their estimated population, against 24.3, 17.6, and 20.8 in the corresponding periods of 1878-9-80. The death-rate last month showed a considerable increase upon the low rates that prevailed in the three preceding months. The lowest annual rate of mortality in the twenty towns last month was 15.0 in Bradford. The rates in the other towns ranged in order from the lowest, were as follow: Portsmouth, 16.8; Bristol, 17.1; Oldham, 17.1; Norwich, 17.2; Brighton, 17.5; Wolverhampton, 17.7; Plymouth, 17.7; Salford, 17.9; Sheffield, 18.7; Birmingham, 20.9; Sunderland, 20.9; Manchester, 22.1; Newcastle-upon-Tyne, 23.1; Hull, 23.5; Nottingham, 24.9; London, 25.0; Leeds, 25.1; Leicester, 26.1; and the highest rate 26.2 in Liverpool. In the nineteen provincial towns, which have an aggregate population very little less than that of London, the annual death-rate during July averaged only 21.3 per 1,000, whereas in London it was equal to 25.0 The high death-rates during last month in Nottingham, London, Leeds, Leicester, and Liverpool were all mainly due to excessive zymotic fatality, which arose from infantile diarrhœa in all the towns except Liverpool.

The 13,521 deaths from all causes in the twenty towns, during the four weeks ending 30th ult., included no less than 2,022 from diarrhœa, 429 from measles, 386 from scarlet fever, 358 from whooping-cough, 219 from small-pox, 115 from 'fever', and 72 from diphtheria. Thus, in all, 3,601, or nearly 27 per cent. of the deaths were referred to the principal zymotic diseases; these were equal to an annual rate of 6.2 per 1,000 in the twenty towns, showing a further considerable increase upon the rate from the same diseases in the four preceding weeks, when it slowly increased from 2.1 to 3.1. This increase was mainly due to the greater fatality of infantile diarrhœa. The zymotic death-rate last month was equal to 7.8 in London, whereas it did not average more than 4.5 in the nineteen provincial towns, among which it ranged from 1.4 and 1.7 in Plymouth and Bradford, to 7.8 in London, 7.9 in Nottingham, and 10.1 in Leicester. Measles showed the largest proportional fatality in Liverpool and Sheffield; scarlet fever in Nottingham and Hull; whooping-cough in Birmingham; and diphtheria in Portsmouth.

The fatal cases of diarrhœa in the twenty towns, which had been but 358 in the four weeks of June, rose to 2,022 in the four weeks of July. The annual death-rate from diarrhœa, which was but 0.21 and 0.49 in May and June, rose to 3.47 in July; it was equal to 4.7 in London, whereas it did not average more than 2.2 in the nineteen towns. In these nineteen towns, the deaths assigned to this cause were equal to a death-rate of only 0.7 and 0.9 in Wolverhampton and Plymouth, to 5.4 in Nottingham, 5.9 in Leeds, and 6.5 in Leicester. The fatality of diarrhœa last month was twice as high in the twenty towns as it was in July 1880, a result entirely due to the exceptional heat that prevailed last month. Next to diarrhœa, measles was again the most fatal zymotic disease in the twenty towns last month, and the annual death-rate from this disease, which had been equal to 0.74 and 0.70 in May and June, was again 0.74 in July; the highest death-rates from this disease were 1.6 in Sheffield and 2.2 in Liverpool. The fatality of scarlet fever showed a marked increase last month, the average annual death-rate in the twenty towns being equal to 0.66 per 1,000, against 0.40 and 0.42 in the two previous weeks; the rate was equal to 1.1 both in Nottingham and Hull. The 358 deaths from whooping-cough gave an average death-rate of 0.61 per 1,000, which corresponded with the rate that prevailed in the previous month; the highest rate was 1.40 in Birmingham. Small-pox caused, during the four weeks of July, 204 more deaths in London, 8 in Liverpool, 4 in Brighton, and one each in Bradford, Hull, and Newcastle-upon-Tyne; thus only fifteen fatal cases occurred in the nineteen provincial towns, which have an aggregate population slightly less than that of London, in which 204 were recorded. Judged, however, both by the fatal cases recorded, and by the returns of the Metropolitan Asylum Hospitals, the prevalence of small-pox in London showed a further decline during July. The number of small-pox patients under treatment in these hospitals, which had been 1,552 and 1,408 at the ends of May and June, further declined to 852 on 30th July, of whom 208 were accommodated at the Convalescent Camp Hospital at Darenth. The average weekly number of new cases of small-pox admitted to these hospitals, which had steadily increased from 20 to 317 in the nine preceding months, declined to 152 in the four weeks of July. The largest proportional fatality of small-pox again occurred last month in the east and south groups of the Metropolitan Registration districts. Fever, principally enteric, caused 115 deaths in the twenty towns during July, equal to an annual rate of 0.20 per 1,000, corresponding with the low rate that prevailed in the preceding month. The highest death-rates from fever occurred in Hull and Portsmouth; the average rate in the nineteen provincial towns only slightly exceeded that which prevailed in London. The 72 deaths referred to diphtheria in the twenty towns were equal to a death-rate slightly lower than that recorded in May and June; 42 occurred in London, and only 30 in the nineteen towns, of which no less than 16 were returned in Portsmouth, 4 in Birmingham, and 3 in Leeds. The epidemic fatality of diphtheria in Portsmouth, which resulted in 62 deaths

during the first six months of this year, showed no decline in July.

The deaths of infants under one year of age averaged no less than 234 per 1,000 of the births registered in the twenty towns during July. This showed a marked increase upon the proportions prevailing in recent months, which was due to the fatality of summer diarrhœa. Infant mortality last month was equal to 271 per 1,000 in London, and averaged 197 in the nineteen other towns. The proportions ranged upwards from 119 in Portsmouth and Oldham, to 311 in Leeds, 344 in Leicester, and 350 in Nottingham.

The fatality of diseases of the respiratory organs showed a further decline during July. The average weekly number of deaths referred to these diseases in London, which had steadily declined from 513 to 216 in the first six months of the year, further fell to 168 during the four weeks of July; this was below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London did not exceed 2.3 per 1,000 in July, against rates declining from 7.2 to 2.9 in the six preceding months. In Liverpool and Salford, the death-rate from the same diseases was equal last month to 4.7 and 1.7 per 1,000 respectively.

During the four weeks of July, the causes of 276 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner; these uncertified deaths were equal to 2.0 per cent. of the total deaths registered. The proportion of uncertified deaths did not exceed 0.9 per cent. in London, whereas it averaged 3.1 per cent. in the nineteen other towns; it was smallest in Portsmouth, Leicester, Nottingham, Birmingham, and Plymouth, whereas it showed the largest excess in Sheffield and Leeds.

In the outer ring of suburban districts around London, having a population now estimated at 958,966 persons, the annual death-rate from all causes during July did not exceed 18.3 per 1,000, which showed, however, a marked increase upon the low rates prevailing in recent months. The annual death-rate from the principal zymotic diseases, which had been equal to but 1.7 both in May and June, rose to 4.3 in July, owing mainly to fatality of infantile diarrhœa. The fatal cases of small-pox registered in the outer ring during the four weeks of July were 33, showing a further increase upon recent monthly numbers. Although the rates of mortality from all causes, and from the principal zymotic diseases, were considerably below those recorded within registration London, they both showed a marked increase upon the rates that prevailed in recent months.

SPECIAL REPORTS.

THE NINETEENTH CENTURY BUILDING SOCIETY.

THE first annual meeting of this society was held at the Cannon Street Hotel. Mr. George Palmer, M.P., the chairman, presided, and among those present were Miss M. E. Richardson, M.L.S.B., Mr. Mark H. Judge, Miss Eliza Orme, Mr. F. A. Hardcastle, Mr. Henry Rutt, and Mr. H. W. Lawrence. The report, which was read, alluded to three of the distinctive features of the society, these were—First, the profits, after five per cent. has been paid to the investors, are divided between the borrowing and investing members; second, the refusal to make any advance whatever upon the inferior property generally known as 'jerry built'; and, third, the rule that all property upon which advances are made shall be in a proper sanitary condition.

The CHAIRMAN, in moving the adoption of the report and balance sheet, said there was good ground for congratulation, in the evidence the balance-sheet afforded of the soundness of the society, and anticipated such a growth in the business that, with his other engagements, he could not properly attend to it. He was therefore compelled to resign his chairmanship, but he would retain his position as a director.

It was announced that Mr. H. W. Lawrence, a nephew of the late Lord Lawrence, would succeed Mr. Palmer in the chairmanship. Mr. Mark H. Judge and Miss E. Orme were re-elected directors, and Miss E. J. Simcox, M.L.S.B., and Mr. James C. Ascott were elected members' auditors. On the motion of Mr. H. W. Lawrence a vote of thanks was passed to the committee of the Parkes Museum of Hygiene, for the course of lectures on sanitation, which the committee had arranged for the benefit of the members of building societies.

NORTHERN COUNTIES ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE Annual Meeting of the Association was held on the 5th ult., in the library of the College of Medicine, Newcastle-upon-Tyne; Dr. J. C. Reid, Medical Officer of Health, Newbiggin-by-Sea, retiring President of the Association, occupied the Chair. There was a considerable attendance of Members. The President noticed with regret the removal by death of two members of the Association, viz., Mr. Stephens, late Medical Officer of Health for North Shields, and Dr. Mackie, Medical Officer of Health for Darlington Rural Sanitary District. The business of the Association was of a purely formal character. Dr. Dalzell, South Shields, was elected a member.

The following were elected Officers for the ensuing year:—President, A. E. H. Trotter, M.D., Stockton-on-Tees; President-Elect, Wm. Clarkson, M.R.C.S., Morpeth; Vice-Presidents; H. J. Yeld, M.D., Sunderland; W. R. Blackett, M.R.C.S., Durham; J. M. Maclagan, M.D., Riding Mill; J. C. Reid, M.D., Newbiggin-by-Sea; Secretary, H. E. Armstrong, M.R.C.S., Newcastle-on-Tyne; Committee, W. Dalzell, L.R.C.P., South Shields; S. E. Piper, F.R.C.S., Darlington; R. Elliott, M.D., Carlisle; H. D. Ward, M.D., Blyth; T. H. Walker, M.D., Stapleton, Carlisle; R. Ayre Smith, M.D., Sunderland.

Resolved: 'That next Annual Meeting be held at Newcastle in July 1882, and that the members be requested to read papers, on which discussions shall be held, in which the public are invited to take part.

The balance sheet of the Association was, after being audited, adopted. The funds are in a satisfactory condition, there being a considerable balance in hand. It was resolved that the travelling expenses of members attending next annual meeting, should be paid out of the funds of the Association. A meeting of the Association will, by invitation of the retiring president, be held at Newbiggin-by-Sea, in September next.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

THE annual meeting of this Society was held in Birmingham on the 7th ult. Among the members present were Messrs. W. S. Till, Birmingham; Lewis Angell, West Ham; J. G. Lynde, Manchester; E. Pritchard, Hon. Sec. for the Midland district; F. Ashmead, Bristol; J. Allison, Manchester; R. Vawser, Manchester; C. Jones, Ealing; T. Cole, Westminster; T. T. Allen, Stratford-on-Avon; H. P. Boulnois, Exeter; J. W. Brown, Aston Manor; G. Cole, Hereford; J. Cook, North Brierly; J. H. Cox, Bradford; B. C. Cross, Dewsbury; A. T. Davis, Solihull; J. T. Eayres, West Bromwich; E. B. Ellice Clark, Hove; J. Gordon, Leicester; R. Hodge, Plymouth; G. Jennings, Rotherham; G. B. Jerram, Walthamstow; J. Lobley, Hanley; H. V. McKie, Carlisle; A. W. Parry, Reading; J. P. Spencer, Tynemouth; G. E. Thomas, Wolverhampton; S. E. Thorold, South Stockton; W. H. White, Oxford; T. W. Bayliss, Redditch; J. Cartwright, Bury;

T. Broughton, Warwick; T. Gledhill, Heckmondwike; D. Hildred, Batley; G. W. Sadler, Cheltenham; H. Mitchell, Hyde: J. H. Hall, Liverpool; J. Devis, Oldbury; W. J. Boys, Walsall; W. Blackshaw, Congleton; A. Crier, Lancaster; J. H. Burton, Audenshaw; and J. W. Fereday.

The annual report, which was read by Mr. Cole, stated that twenty-five new members had joined the association this year, three members had died, and the total membership now numbered 204. The members were urged to make every effort to increase the roll of the association. The report was adopted, and Mr. MORANT, the outgoing president, then vacated the chair, which was taken by Mr. W. S. TILL, president-elect for the ensuing year.

Mr. TILL, in his presidential address, said, he had prepared a brief description of the borough of Birmingham, together with information as to its streets, night-soil, and sewage works. After giving various statistics as to the former points, Mr. Till explained the sewage arrangements. The Council, in 1872, with the view of reducing the difficulties connected with the treatment of the sewage at Saltley, decided upon the introduction of the pan system for collecting night-soil, and at the end of last year there were about 32,000 pails in the borough, estimated to provide for about 250,000 persons. There were about 1,000 water-closets, and the remainder of the population were supplied with the old form of combined privy and ash-pit. The cost of the night-soil department in 1880 was £42,996 17s. 5d., of which £27,196 2s. 2d. was for collection, etc., of pail contents, and the remainder for the removal of old night-soil; the receipts for the pail contents were £5,702 3s. 1d., and for old night-soil £1,992 8s. 7d., or a net cost to the borough of £35,296 5s. 9d. The total length of sewers now under the care of the Corporation was about 175½ miles. Upon the United Drainage Board, which was formed in 1877, now devolved the duty of treating and purifying the sewage delivered by the various constituent authorities at the outlet works. The area of the present Saltley Farm was 272 acres, of which 170 was freehold. The three large tanks and sixteen smaller ones had a capacity of 43,310 cubic yards, or about 7,300,000 gallons. The amount of sludge deposited in the tanks during 1880 was 1,784,000 cubic yards, or about 490 cubic yards per day, and required an area of 53½ acres of land for digging in the same, or rather more than one acre per week. The average dry weather flow of sewage was about 13,000,000 gallons per day, the population contributing to that amount being roughly estimated at 450,000, being about twenty-nine gallons per head. A little over thirteen tons of lime were used per day, the lime being slacked and ground with water under edge-runners. No nuisance arose from the present method of dealing with the sludge, as was sufficiently proved by the fact that there were nearly 3,000 houses within half-a-mile of the boundary, and no complaints were made by the inhabitants as to the operations now carried on.

Several amendments of the rules were discussed. It was resolved to limit membership to the chief officers of Corporations and Sanitary Authorities, and that members who after 1881 ceased to hold any public appointment should be eligible for re-election, but disqualified from holding any office under the Association.

The proceedings of the morning sitting on Friday, the 8th, were opened with a discussion as to the works of the Birmingham Corporation, visited on the previous day.

Mr. J. LEMON (Southampton) said he must enter his protest against what he considered one of the most disgraceful exhibitions of sanitary work he had seen. He referred to the intercepting works at Montague Street. He wanted to know why there should be one system for the rich and another for the poor, and he hoped the Corporation would see their present folly, and would at no distant date altogether remove that Montague Street abomination. The present system of the Corporation was most insanitary and expensive. It meant that out of the population of Birmingham, 300,000 persons were using the pail system, and about 100,000 were using water-closets. Judging by the mileage of sewers, he supposed the town was tolerably well drained, and why should they not, therefore, take away the excreta at the time the slops were removed? No larger area was required than to take away the slops only, and the objection on the ground of expense was absurd, and required no answer. The only advantage alleged to be possessed by the system in Birmingham, was, that the excreta was got rid of at the outfall, but he pointed out that they did not evade the cost of removal, for the Corporation paid £35,000 per annum for this. The system of sewers existing in the town was fully capable of removing by water-carriage the whole of the excreta of the borough with more efficiency and less nuisance. The present mode was likely to spread disease, and was, therefore, revolting to every sanitarian. He was at loss to know why the Corporation carried it on, and he felt it his duty to call upon the members to speak openly and fearlessly against one of the most abominable systems in this country.

Mr. R. F. MARTINEAU, who was present as a visitor, said, on behalf of the Committee, that he was prepared to defend the pail system tooth and nail. The members of the Association must recollect the circumstances of Birmingham under which the pail system was adopted. When the enormous population of Birmingham and its rapid growth were considered, he thought the engineers present would recognise the immense cost that would have been necessary to obtain land enough to treat properly the whole of the sewage. With reference to the water-closet system, he supposed it must be a matter of the greatest possible difficulty, if not one of impossibility, for the people in the poorer portions of the town to keep the water-closets in such order that smells should not enter the house. How defects could be possibly attended to where such carelessness and ignorance existed, was entirely a mystery to him. Replying to the accusations as to the dissemination of disease by means of the collection of miscellaneous refuse, Mr. Martineau quoted numerous statistics showing the improvement in the death-rate of the borough, especially with respect to zymotic diseases.

THE SANITARY SUPERVISION OF DWELLINGS.

Mr. LEWIS ANGELL read a paper on 'The Sanitary Supervision of Dwellings.' He pointed out that the demand for sanitary supervision had recently found expression in the establishment of societies for sanitary inspection on co-operative principles. The fact of the existence of such societies, be they due to philanthropy or stock-jobbing, raised the great question, Is such sanitary supervision necessary; and, if this be granted, by whom should it be conducted? That supervision was necessary would be admitted by all who had any official experience. Thousands of houses were annually put together in a manner dangerous to the lives of the occupants, and formed a combination of contaminating influences which lower vitality and endanger life. The result is due as much to ignorance as to carelessness, a concourse of fortuitous evils rather than a conspiracy; although, he regretted to add, as the result of official experience, that in many instances it was also the result of the most wilful and wicked cupidity. The Local Government Board recently issued a series of model by-laws for buildings, involving very much detail. He would gladly have urged their adoption by his Board (West Ham, Essex) had he not felt there was no chance of their general observance, over a district of seven-and-a-quarter square miles, with the staff at his disposal. The imposition of building fees was urged for the provision of the necessary staff, but refused to the applicants. To a condition of things such as he described, in houses new and old, were undoubtedly due the lassitude, the illness, and the deaths of thousands, whose inherent power of resistance was unequal to the fight. Having shown that sanitary supervision was needed, he urged that it was equally obvious the work should be a public and an official one, and not undertaken by amateur or stock-jobbing companies, whose philanthropy was confined to shareholders. Unlike the more advanced public opinion in America, where official factory inspection had been extended to tenement houses, the British ratepayer was not sufficiently educated in sanitary principles. He submitted that a more efficient and ex-

tended supervision of the sanitary and constructive details of all dwellings was necessary; that such supervision should be conducted by the responsible officers of the Local Sanitary Authority, and not left to private commercial enterprise; and that it was just that fees be imposed on all new buildings to provide the cost of such supervision. He declared, however, that there was more hope in education than in officialism.—Mr. E. B. ELLICE CLARK (Hove) said great difficulties had to be encountered before an effectual supervision could be exercised throughout the country. The Government standard of what that supervision should be had been by no means reached in all places. It would be impossible in some towns to insist on stringent sanitary provisions, however necessary; but it should be the aim of the municipal surveyor to gradually work up to the standard required. Dealing with what should be supervised, he urged that where the inspection staff is limited, the four cardinal points for supervision should be (1) the structure of walls, roofs, foundations, and spouts of new buildings, for securing health and stability and the prevention of fires; (2) sufficiency of space about new buildings to secure a free circulation of air; (3) ventilation and drainage of new buildings; and (4) closing of buildings, or parts of such, when unfit for human habitation, and prohibition of their use. All these points were empowered by the Public Health Act, but if the requirements of modern sanitarians were to be met, there should also be subject to supervision and control the height of rooms, thickness of floors, physical conditions of the site as to floods, whether from sewers or water-courses, works necessary to be carried out in the distribution of water for dietetic purposes, and many other matters necessary to place a house in a good sanitary condition. Supervision, to be of any value, must be exact and impartial. If coercive laws were to be carried out, no discretionary power should be left in the hands of local authorities or officials, such discretion being open to serious objections. As to the probability of the detailed model by-laws being stringently enforced on the community, Mr. Ellice Clarke said they might fairly assume a higher state of health, morality, and civilisation, but they must, in exercising something akin to parental control, take care that individual responsibility was not removed from the shoulders of the builders and workpeople to that of the officials. Individual responsibility brought self-reliance, and whatever restrictions were placed on buildings, or whatever supervision was exercised, it must always be borne in mind that the condition of a building is the responsibility of the builder.—Mr. J. G. LYNDE (Manchester) stated that supervision, in which was included most of the points recommended by Mr. Angell, had been in force in Manchester for several years past. A certificate was given by the City Surveyor to the effect that the by-laws had been complied with before a house could be occupied. This was done without any cost to the builders, and he thought the system of fees objectionable.—Mr. ASHMEAD (Bristol) said that by virtue of a special Act, supervision had been increased in Bristol for many years, a special charge being made to the builders for the certificate that the conditions had been complied with.

THE AWARDS OF THE SANITARY INSTITUTE OF GREAT BRITAIN.

THE Judges appointed by the Council of the Sanitary Institute of Great Britain, have recommended to the Council the following distribution of Medals and Certificates to the Exhibitors at the Sanitary Exhibition at Exeter, 1880.

MEDALS.—Carter, John, 6A, New Cavendish Street, Portland Place, London, W., for Invalid Furniture. Colman and Glendenning, Chalk Hill Works, Norwich, and 62, St. Martin's-le-Grand, London, E.C., for School Furniture. Hunt, N., 43, City Road, Bristol, for his Patent System of Auto-pneumatic Ventilation. Moore, Josiah, Sekford Works, St. James's Walk, Clerkenwell, London, for Glass Louvre Ventilators. Moser, L., Southampton, for Dry Closet, suitable for Ashes or Disinfecting Powder. Sanitary and Economic Supply Association, Limited, Gloucester, for Dr. Bond's Patent Euthermic Ventilating Gas Stove. Tylor, J. and Sons, 2, Newgate Street, London, for Patent Flushing Rim Lavatory Basin and Apparatus. Webb, H. Clark, Worcester, for his method of impregnating Wood with colours in patterns. Wilson Engineering Company, The, Pear-Tree Street, Goswell Road, London, for the Wilson Portable Close Cooking Range. Bean, A. T., Direct-acting Valveless Waste-Preventer. Doulton and Co., Lambeth, London, Ventilating Tile Stove.

SILVER MEDALS GIVEN BY THE EXETER GAS CO.:—Sanitary and Economic Supply Association, Limited, Gloucester, for Dr. Bond's Patent Euthermic Ventilating Gas Stove.

CERTIFICATES to the undermentioned Exhibitors:—Bird, P. Hinckes, 1, Norfolk Square, London, W., for Large Legible Spirit Thermometer. Branksea Island Pottery Co., Limited, Poole, Dorset, for Stoneware Pipes. British Sanitary Company, 205, Buchanan Street, Glasgow, for Patent Self-Acting Earth Closet. Brock, William, and Co., 177, Fore Street, Exeter, for 'Non-such Adjustable Chair'. Brock, William, and Co., 177, Fore Street, Exeter, for Bed-Rest with Movable Arms. Calvert, F. C., and Co., Bradford, Manchester, for Improved Vaporiser for Disinfecting. Candy and Co., Newton Abbott, for 'Granite Vitrified' Bricks and Paving. Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for the 'Sunlight' Stove. *Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for Excelsior Patent Spring Mattress. Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for Invalid's Adjustable Bed. Colman and Glendenning, Chalk Hill Works, Norwich, for Patent Automaton Seat for Drapers. Constantine, T. J., 61, Fleet Street, London, E.C., for the Devonshire Cooking Range. Craig, J. M., Kilmarnock, N.B., for Buchan's Patent Trap. *Doulton, H., and Co., Lambeth, London, for Patent Anti-percussion High Pressure, Draw-off Valves. *Doulton, H. and Co., Lambeth, for Stanford's Patent Joints for Stoneware Pipes. Garton and King, 190, High Street, Exeter, for Vowel E. Bradford's Patent Family Washing Machine. Hancock, F. and C., Dudley, Worcestershire, for Dough Kneading Machine. Hancock, F. and C., Dudley, Worcestershire, for New Propeller Churn. *Lascelles, W., 121, Bunhill Row, London, for Concrete Bath in one piece. *Maignen, P. A., 20 and 23, Great Tower Street, E.C., for Patent Filtre Rapide. Maignen, P. A., 20 and 23, Great Tower Street, for 'Bijou' Filtre Rapide. McCallum, J. B., Borough Surveyor, Stafford, for Improved 'Non-Absorbent' Tub or Pail Van. Parker, J., Woodstock, Oxon., for Dry-Earth Commode without Separator. Pritchett, G. E., 20, Spring Gardens, London, for Corrugated Iron Hot-water Warming Appliances. Pritchett, G. E., 20, Spring Gardens, London, for Improvements in Thermometrical and Barometrical Instruments. Salmon, Barnes, and Co., Canal Head Foundry, Ulverston, for Revolving Shutters with Patent Balance-Weight Motion. Sharp, C. H. and Co., 104, Newgate Street, London, for Ornamental Inlet Ventilators. Silicated Carbon Filter Company, Battersea, for Silicated Carbon Double-Chambered Table Filters. Tylor, J., and Sons, 2, Newgate Street, London, E.C., for Improved Enamelled Iron Slop Sink with Patent Regulator Supply Valve. Tylor, J., and Sons, 2, Newgate Street, London, E.C., for Patent 'Waste-not' Regulator Valve. Tylor, J., and Sons, 2, Newgate Street, London, E.C., for Improved Full Way Stop Valve. Willey and Co., Gas Engineers, Exeter, for their exhibit of Gasaliers and Gas Brackets. *Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Moule's Earth-Closet. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Ransome's Artificial Stone Air-Brick. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Conservatory Boiler, with Hot-water Pipes. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Cottage Range. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Fenby's Patent 'Paragon' Camp Furniture. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Chappuis' Daylight Reflector. Wippell, Bros. and Row, 231 and 232, High Street, Exeter, for Improved Housemaid's Box with Sifter. Calvert, F. C. and Co., Bradford, Manchester, Car-

bolic Acid and Preparations of it. Carter and Co., Old Refinery, Bristol, Mineral Waters and other Beverages. Doulton and Co., Lambeth, London, Flush-out Closet. Fry, J. S. and Sons, Union Street, Bristol, Specimens of Chocolate and Cocoa. Hutchinson, A. and Co., 3 and 4, Great Winchester Street, London, India-rubber Gas Tubing. Skinner, G. H., 13, North Street, Exeter, Mineral Waters and other Beverages. Stephan, J. A., Rainbow Hill, Worcester, Carbonised Iron Stone Mound Filters. Tylor, J., and Sons, 2, Newgate Street, London, Patent 'Clear Way' Regulator Valve Water Closet, with Patent Parallel Pull.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BATH.—The most remarkable feature of the vital statistics of this city for 1880 (viz., the serious outbreak of small-pox in the first quarter) has already been commented on in these columns. The general death-rate was 20.4 per 1,000, the lowest for the last five years, and the zymotic death-rate 1.9 per 1,000. The infant mortality was, however, excessive, 199 deaths occurring amongst infants under one year of age. Dr. Brabazon admits that this mortality is much higher than it should be, and, no doubt, he is right in thinking that with proper care, wholesome diet, and sufficient clothing, so lamentable a sacrifice of life might to a great extent be prevented. The mortality from constitutional and chronic diseases was below the average, particularly in the last quarter of the year, a fact which is attributed to the mildness of the season. It is singular that, notwithstanding the very general prevalence of diarrhœa in the autumn of last year, only seven deaths from that disease occurred at Bath. But little information is given as to sanitary progress, but something has been done in the direction of supplying pure water in the place of impure water derived from wells contaminated with sewage. The structural conditions of a street of houses, owned by the Charity Commissioners, are described as being 'as bad as possible'.

BIRMINGHAM.—The death-rate in this borough still continues to decline; for the first quarter of the present year Dr. Hill reports a rate of 21.29, against rates of 27.06, 26.15, and 22.36 respectively in the winter quarters of 1878, 1879, and 1880. The diminished death-rate is partly owing to the smaller mortality from the seven principal zymotic diseases, all of which have been less prevalent; and partly to the diminished death-rate from phthisis, and developmental and local diseases, particularly those of the respiratory organs. This result is somewhat remarkable, considering how intensely and exceptionally cold the weather was during the quarter. The most prevalent diseases were whooping-cough, which was fatal in 70 cases. Both in 'fevers', diphtheria, and measles, there was a marked decline as compared with the winter quarter of 1880. Small-pox was fatal in five cases out of a total of seventeen which came to Dr. Hill's knowledge. The borough hospital continues its useful work; during the quarter thirty-two cases of scarlatina and sixteen of small-pox were isolated, whilst a number of other diseases were also treated within its walls.

BRISTOL.—For last year a death-rate of 20.0 per 1,000 is reported here as compared with 21.4 for 1879. This improvement, however, Mr. Davies explains, was but little, if at all, due to any improvement in the hygienic condition of the city, but rather to 'the little understood meteorological conditions of the atmosphere, which so much influenced the prevalence and fatality of almost all diseases; and possibly to a diminished population'. The mortality amongst children under five years of age was no less than 42 per cent. of the total deaths. As many as 184 deaths were attributed to diarrhœa alone, whilst 244 deaths were referred to scarlatina. Ninety-five deaths from whooping-cough occurred, the fatality being chiefly amongst children of the poorer classes, among whom the means of administering proper warmth and nursing to a sick child are most inadequate. It is satisfactory to note a decrease in the number of deaths from phthisis, which Mr. Davies thinks is chiefly indicative 'of a slight real improvement in sanitary condition, especially by the better house accommodation of the people, arising from the removal of old, ill-constructed, over-crowded, and badly-ventilated courts and streets . . . and the subsequent disposal of the inhabitants into new and better constructed houses'.

EDINBURGH.—Dr. Littlejohn's report on the mortality of the city during the month of June states that there had been 370 deaths, giving a death-rate of 20 per 1,000. The average death-rate for the month of June during the past five years has been 19.84. The number of births was 642, being equal to a rate of 34.55 per 1,000. Dr. Littlejohn likewise submitted reports for the quarter and the half-year ending June 30. In the former period there were 1,132 deaths, giving a death-rate of 20.3 per 1,000, the average for the same months during the last five years being 22 per 1,000. In the half-year, there had been 2,333 deaths—a rate of 21 per 1,000. There had been 1,411 cases of infectious diseases reported to the Medical Officer of Health, in terms of section 208 of the Municipal Act. Of these 11 were cases of typhus fever, 150 typhoid, 72 diphtheria, 857 scarlatina, and 321 measles. Of the total number of infectious cases 164 had been compulsorily removed to the hospital. A sum of £176 7s. 6d. had been paid for reporting these infectious cases. Dr. Littlejohn further stated that, in prospect of a possible outbreak of small pox, arrangements were made for public vaccination.

EVESHAM RURAL.—Mr. Fosbroke, as usual, writes an excellent report upon this and other districts under his charge. At Evesham last year there was an actual death-rate of 17.3, the lowest since 1876, but the infantile mortality was again excessive. Small-pox was entirely absent from the district, but typhoid fever was prevalent, eleven cases being reported, three of which were fatal. Four cases only of summer diarrhœa are reported. The sanitary condition of the district appears to have received Mr. Fosbroke's unremitting attention, but he does not seem to be well supported by the Sanitary Authority, since a long list of insanitary conditions still remains. The present state of the water-supply question is unsatisfactory, but this may be due to the enormous difficulty which naturally attends any scheme for supplying water to a town so peculiarly situated as Evesham. Somewhat late in the day a code of bye-laws has been prepared, and arrangements are pending for the erection of a hospital for infectious diseases. Remembering the insufficient and bad cottage accommodation which has so long been a slur on the borough, it is satisfactory to learn that a local Artizans' Dwelling Company has been started, having for its object the improvement of the existing cottages and the erection of new ones. This is certainly a step in the right direction, since the application of the 'Artizans and Labourers Act' is inapplicable to the district.

GLOUCESTER.—The inadequacy of the water-supply of Gloucester is a matter that Mr. Wilton has to bring before his Sanitary Authority year after year with the same desponding narrative of nothing having been done to remedy the deficiency. In his report for 1879 he expressed himself as apprehending, with very great anxiety, the occurrence of even a moderately dry season, and he feels the same anxiety now. When the persons using the city water were thousands less than at present, if the summer was only moderately dry, it became necessary to give for a long period an intermittent supply. This is at all times not only a source of great inconvenience to many householders, especially among the poor who have no means of storing water, but is a fruitful source of zymotic disease. It is to be hoped that the central Board will now really take the matter in hand and insist on an additional supply. During the year the lodging-houses were inspected and found satisfactory, but an inspection of the slaughter-houses revealed many defects, which point to the necessity of the provision of a public abattoir. Notwithstanding the numerous insanitary conditions of the town, a low death-rate of 18.95 reported, which is less than that for 1879 by 1.7 per

1,000. The zymotic death-rate was considerably swollen by the excessive mortality from infantile diarrhœa, which occurred chiefly in the third quarter of the year. Of 49 deaths from this disease, 43 were of children under 5 years of age, but Mr. Wilton says nothing helpful as to the circumstances of the diarrhœa prevalence.

LOUTH RURAL.—Considerable advance is noted by Dr. Domenichetti in the sanitary condition of his district last year, but the floods, so generally prevalent through England, were severely felt there, causing not only the destruction of the crops, but contaminating the springs and water-courses, and thus giving rise to typhoid fever. This disease, indeed, was epidemic during the latter part of the year at Legbourne and Little Cawthorpe, terminating fatally in six cases. The general death-rate was 15.3 per 1,000 and the zymotic rate 1.8. There is a notable decline in the number of deaths from phthisis, but the mortality amongst children shows an increase. A decided improvement is reported in house accommodation, and much unpretentious work was done in improving house drainage. The water-supply needs improvement in some places where it is contaminated with the drainage of houses and farmsteads; but Dr. Domenichetti fully appreciates the importance of this question, and has it well in hand.

TEIGNMOUTH.—If sanitary improvement in this town progresses, it is somewhat slowly. The present water-supply is by no means satisfactory, especially in the summer months when the supply is available for a few hours daily. Last year the water was discoloured by what is described by Dr. Lake as a 'green microscopic organism'; whilst the main sewerage of the town remains almost in abeyance, and the present sewers suffered from insufficient flushing and ventilation. The town, too, is still without hospital accommodation, although the Sanitary Authority have provided an ambulance for the removal of cases of infectious disease. An advance has, however, been made in the scavenging and removal of house refuse, which would seem to be now carried out in a systematic manner. The death-rate (16.7 per 1,000) remains the same as in 1879, and the zymotic death-rate is given as 2.6 per 1,000. Whooping-cough occurred epidemically during the first part of the year, and measles and scarlet fever were somewhat prevalent. Of five cases of enteric fever reported, two were due to sewer emanations in the town, and the cause of the others remained undiscovered.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

POLLUTION OF WATER BY SEWAGE.

1880. *A. G.* v. *Birmingham, Mayor.* Decree made restraining the pollution of a stream by sewage, but its operation suspended for five years, to permit remedial works—On a different Authority being created, with a different area, but clothed with the powers, etc., of the Authority against which the decree had been originally made, held that the decree could not be properly put in force against the new Authority, as regards the newly-included area, but that a new action must be brought. (L.R., 15 Ch.Div., 423; 43 L.T., 77.)

LANDLORD AND TENANT.

1879. *Budd* v. *Marshall.* "Public Health Act, 1875," s. 104—Plaintiff charged as landlord with the expenses of certain drain communications—Action against tenant under a lease to refund—Held that under the covenants of the lease the tenant was liable. (50 L.J., C.P. 24; L.R. 5 C.P. 481; 42 L.T., 792; 44 J.P., 584.)

INTEREST IN CONTRACT.

1880. *Fletcher* v. *Hudson* "Public Health Act, 1875," s. 253, Sched. ii, Rules 64 and 70—Members disqualified by participation in profits of work done for Board—The Rules in question are not dependent on the Section in question, and any person may sue for the penalty mentioned in Rule 70. (49 L.J. Ex., 793; L.R., 5 Ex.D., 287; 43 L.T., 404; 45 J.P., 5.)

ADULTERATION OF FOOD.

1880. *Horder* v. *Meddings.* "Sale of Food Act, 1875," s. 6—Coffee adulterated with 75 per cent. of chicory—"Coffee" asked for by purchaser—After sale, but before delivery, Vendor labelled it "a mixture", etc., on proof of which fact the Magistrate refused to convict—Case remitted to Magistrate, because he had not found whether the statement of the mixture was for the purpose of concealing a fraudulent increase in the bulk of the article—Semble that it was—Otherwise, vendor's defence good. (44 J.P., 234.)

ARTIZANS' DWELLINGS.

1880. *Jones, ex parte.* "Artizans' Dwellings Act, 1875"—Purchase of lands—Limitation of costs payable by Local Authority in respect of moneys paid out of court. (L.R. 14 Ch.D., 624; 43 L.T., 84; W.N. 1880, 134.)

SEWER.

1880. *Lamacraft* v. *St. Thomas Rural Sanitary Authority.* "Public Health Act, 1875, ss. 16, 19, 27, 305—Proposed sewer—Refusal by plaintiff, a landowner, to permit entry—Whereupon forcible entry—Injunction to restrain works granted, it being shown that such works when finished must of necessity create a nuisance—S. 305, allowing entry under Justice's order, does not apply to entry to construct sewers under s. 16. (42 L.T., 365; 44 J.P., 441.)

ARBITRATION.

1879. *Lancaster Water and Improvement Act, In re.* Functions of Arbitrator—His powers to accept or reject evidence involving matters of opinion—Motion to rescind Order of Reference, on the ground that Arbitrator had prejudged the case. (*Times*, Nov. 28, 1879.)

UNWHOLESOME FOOD.

1880. *Moody* v. *Leach.* "Public Health Act, 1875," ss. 116-17, 119—These sections include live animals—But in the particular case the evidence was held sufficient to show that a live cow found in a building adjacent to a slaughter-house was not placed there intended to be killed for food. (Q. Sess.) (44 J.P., 459.)

LOCOMOTIVES ON ROADS.

1880. *Powell* v. *Fall.* "Locomotives Act, 1865," s. 12—Rick set on fire by traction engine passing along road—Held that owner was liable at Common Law for damage done. (49 L.J., Q.B. 428; L.R., 5 Q.B.D., 597; 43 L.T., 562; 45 J.P., 156.)

ELECTION.

1880. *Reg.* v. *Ellis.* Local Board election—Candidate elected who was not qualified, because not rated, passed over by Returning Officer, who returned candidate who was in minority—Rule for *Quo warranto* against minority candidate discharged, and Returning Officer exonerated. (44 J.P., 748.)

LIABILITY FOR ACCIDENTS.

1880. *Reg.* v. *Ware Guardians.* Sewer grating improperly laid—Injury to a horse—Claim of compensation—Mandamus to Board to pay compensation awarded by Arbitrator—Held that the injury was not a matter for compensation at all, the fact disclosing neglect which was actionable, not a mischance arising necessarily from carrying out statutory powers. (*Times*, March 15, 1880.)

FOOD AND DRUGS.

1880. *Rouch* v. *Hall.* "Sale of Food Act, 1875"; "Amendment Act, 1879"—S. 14 of former Act does not apply to cases within s. 3 of the latter Act. (50 L.J., M.C. 6; L.R. 6 Q.B.D. 17; 44 J.P., 748.)

BUILDING BY-LAWS.

1880. *Watson* v. *Gray.* Adjacent owners—Meaning of the word "Party wall"—The most ordinary and primary meaning is a wall of which the two adjoining owners are tenants in common. (49 L.J., Ch. 243; L.R. 14, Ch D. 192; 44 J.P., 537.)

PAVING EXPENSES.

1880. *Wakefield Urban Authority* v. *Mander.* "Public Health Act, 1875," s. 150—Foot pavement on one side of street made good in terms of the statute, and expenses apportioned only on owners on that side, to the enure exemption

of owners on the other side—Held that such restricted apportionment was good. (L.R., 5 C.P.D., 248; 28 W.R., 922; 44 J.P., 522.)

PURCHASE OF LANDS.

1880. *Wells* v. *Chelmsford L.B.* "Lands Clauses Act," 76-7 –Action by vendors for specific performance of agreement for purchase of lands by a Board—Complicated conditions—Failure of vendors to make a good title to all the land—Payment of purchase money into Court held, under the circumstances, improper, and specific performances decreed under conditions. (49 L.J., Ch. 827; L.R., 15 Ch.D., 108; 43 L.T., 378; 45 J.P., 6.)

REVIEWS.

Peasant Life in the West of England. By FRANCIS GEORGE HEATH, M.D. New Edition, pp. 400. London: Sampson Low, and Co. 1880.

MR. HEATH'S works are always picturesque and interesting, and he has the enviable gift of creating enthusiasm in others for any subject that he touches. The first product of his pen, on the subject of peasant life in the West of England, was issued in 1872, when the condition of the agricultural labourers was one of the burning questions of the day; and it at once met with much attention as an important and valuable contribution towards a subject of vast national and social importance. Since then, Mr. Heath has published in 1873, a larger work on the same subject; and he now in the second volume reproduces the substance of his two previous books with a great deal of added matter. The volume covers a wide field with which this journal has comparatively little concern, though it cannot be denied that at the root of most of the evils of the labourer's condition, lies the shamefully inadequate and improper house accommodation with which he has heretofore had perforce to be content. Mr. Heath seems disposed to be hopeful as to improvement in this particular, as in others, though he gives a sufficiently lurid picture of the overcrowding and sanitary neglect that characterise by far the larger number of rural cottages. Some brilliant exceptions there have been to the general rule of complete disregard by landlords and farmers as to the housing of their labourers, but it is not too much to say that up to within the last few years, this has been the last subject to engage the attention of employers. Pure air must indeed be an elixir, when it can counteract the noxious influences that surround a cottager's home: the damp site; the uneven earthen floor; the confined, dark, unventilated rooms that serve as living-room and bedroom for people of all ages and both sexes; the reeking cesspit outside; the well polluted with excremental soakings; *et id genus omne.* In this matter it is almost vain to expect efficient action from sanitary authorities, who are composed for the most part of farmers who employ the men, and own their wretched dwellings. The only hope lies in the gradual growth of education, and an understanding of the first principles of hygiene and social economy. Mr. Heath's picture is to our knowledge not overdrawn, and it must be highly gratifying to him to find that in places that he singled out for special condemnation in 1872, there has since been a perceptible change for the better, both in the physical and pecuniary condition of the labourer. To quote what he says on the sanitary question, is really to tell a twice-told tale. We will only say that his work contains in a small compass a wealth of fact and information, that to those desirous of ameliorating the condition of our peasants must be of priceless value. It is no part of our function to deal with the causes of the present agricultural depression, or with the social condition and prospects of the labourer; but his sanitary surroundings come peculiarly within our province, and there is no room for doubt that what Mr. Heath describes as existent in the West of England, exists also equally as badly in other parts of the kingdom. The attention which the subject has had of late is, however, already bearing fruit, and there are grounds for the belief, that concurrently with other improvements in the labourer's means of existence, that of a decent weather-proof cottage will be increasingly vouchsafed to him.

The Disposal of the Dead: a Plea for Cremation. By E. J. BERMINGHAM, A.M., M.D. 8vo, Pp. 89. New York, 1881.

Cremazione e Medicina Legale (*Cremation and Legal Medicine*). By Dr. G. COLOMBO. 8vo, pp. 12. Milan, 1881.

The Order of Cremation of the Dead by Fire. By A CATHOLIC PRIEST. 12mo, pp. 16. London, 1881.

THE literature of cremation is increasing rapidly. In one week only we receive the book and the two pamphlets whose titles are given above, and it would seem that the sentimental opposition to the practice is giving way, when a Catholic Priest publishes the following sentences:—'As to the religious aspect of the question, nothing can be more reverent than this mode of disposing of the dead, and the words of the funeral service, "ashes to ashes", will possess a reality they never did before. Also the beautiful anthem, "When thou passest through the fire, I will go with thee", and such like, would find a most touching response. Again, the moral and spiritual teaching suggested by the body passing through the purifying fire, and the upward ascent of its etherealised matter and gases, is too obvious to need any pointing out, even though many in our country may be too crass to see it'.

The following is the only alteration made in the burial service:—'Forasmuch, brethren, as it hath pleased Almighty God in His great wisdom to take into the unseen the soul of our dear brother (or sister) here departed, we therefore invoke upon him (or her) the great mercy of God, and peace and light eternal, and we commit his (or her) body to the purifying elements of fire, earth to earth, ashes to ashes, dust to dust.'

We shall agree with Dr. Colombo in his argument, that whether dead bodies are buried or burnt, certificates of the cause of death should be given with much more care than they are now, whether in Italy or England.

Dr. Bermingham writes well on the evils of burial, and on the history of cremation. He describes the new crematory at Washington, and brings forward many proofs of the increasing necessity for cremation with increasing population.

When following the coffin of the late Dean Stanley to the grave under the chapel in Westminster Abbey, where the coffin of the Dean rests beside that of his wife in ordinary earth, left, as the *Times* report reads, 'to mingle with the sacred dust of the Abbey', we shuddered to think of the putrefying process which must go on while the 'worm destroys this body' before it can become 'sacred dust'; and came away sorrowfully contrasting what might have been, had a purifying fire consumed all that can be hurtful of the good man who had just shuffled off his mortal coil, and instead of a mass of corruption, had left only harmless ashes behind, faithfully preserved in a memorial urn, unchanging as long as the Abbey endures.

Influence de la Boue et de la Poussière sur l'Hygiène des Villes. PAR J. VERRINE, Ingénieur du service municipal de la ville de Caen. Pp. 60. St. Quentin: Ch. Poette, 1879.

M. J. VERRINE has, in this little pamphlet, which has been awarded a prize and gold medal by the Academical Society of St. Quentin, gathered together a number of very interesting considerations on the too neglected subject of mud and dust, and their influence on the health of towns. He recommends the use of improved appliances in their collection and prevention, and argues strongly in favour of the work being undertaken by local authorities themselves, all other means of securing the object desired having proved abortive.

THE

SANITARY AND MEDICAL EXHIBITION

AT SOUTH KENSINGTON.

CONCLUDING NOTICE.

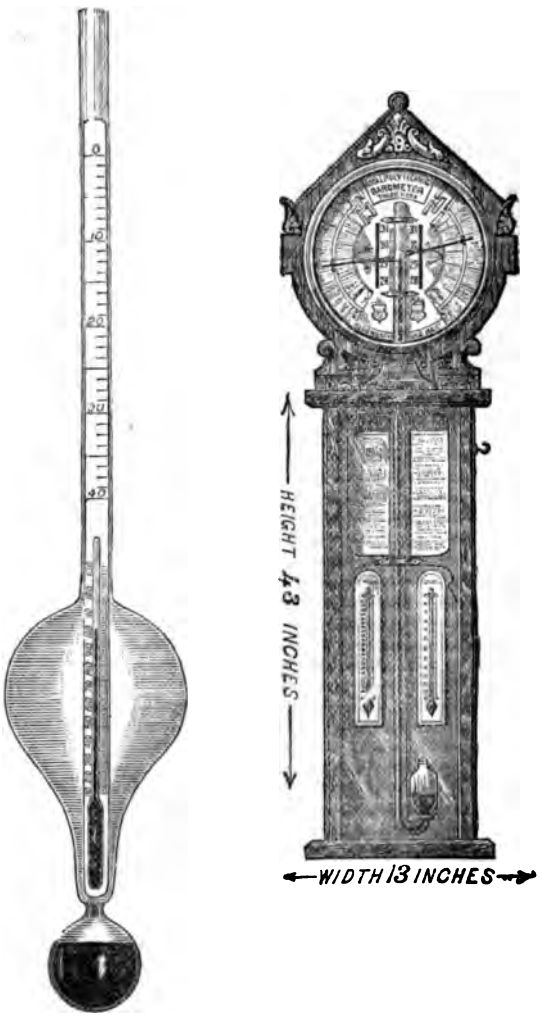
THIS Exhibition, which closed on Saturday, marks a slight departure from those of the same kind we have been accustomed to see. Hitherto, medicine and sanitation have been divided into separate exhibitions; here they were massed together, and there were few articles connected either with pharmacy, mineral waters, non-alcoholic beverages, surgical instruments and appliances, drainage, ventilation, and the numberless appliances that add to the health and comfort of our homes, that were not represented—and, upon the whole, well represented—and it may be fairly said that the sanitary department of the Exhibition was the largest that has as yet been seen in this country, and probably in any other.

There was a fair quantity of new inventions shown, and many others, if not quite new, of which but little was known. Looking at the awards as a whole, we consider that good judgment has been evinced by the gentlemen who have kindly given their time to fulfil the always unthankful office of judges.

As we have given descriptive notices in former numbers of the SANITARY RECORD and in our Illustrated Pamphlet, and we here append several others that we were unable to obtain in time for publication in the Pamphlet, we can only in addition take a rapid glance at the exhibits as a whole. Many of them were of such equal merit, that to mention one name necessitates the enumeration of several, if we would do justice to all. In sanitary stone ware, Messrs. Doulton and Co.; Messrs. Stiff and Son; Wilcox and Co.; Burmantofts (Leeds); Smith and Son (Old Kent Road); and Cliff and Sons, deserve great credit for the collections they displayed; in closets Messrs. Warner and Sons, Hayward Tyler and Co., Messrs. Doulton and Co., Capper and Son, Bostel, Emanuel and Son, and others, showed to advantage; and in earth closets, Moule's Earth Closet Company appeared quite capable of holding their own against all comers. In heating, lighting, and ventilating there was much to admire, and in this department we are bound to put Messrs. Verity Bros.' apparatus for ventilation and heating in the front rank. We must, however, not forget the new application of steam and hot-air combined, the invention of Mr. Stevens of Lewisham, and the cabinet hot-water apparatus of Mr. Hellier, of Duke Street, Grosvenor Square. Of outside ventilators, those of Messrs. Boyle and Son, Mr. Banner, Mr. Howarth, and Kite and Co., amongst others, claim our attention; and of ventilating grates, Messrs. Steel and Garland, Mr. Griffin, and Mr. Edwards, each have interesting features to recommend them; in the heavier class of boilers and heating apparatus, we are disposed to recommend the apparatus of the Thames Bank Iron Company. Messrs. Steven Bros. and Co., showed to advantage in general iron work, kitchen-ranges, and sanitary iron work, but the exhibits of Macfarlane and Co., of Glasgow, in the last-named class of goods, stood alone, and can only be spoken of in the highest terms.

Messrs. HOWARD & Co., Berners Street, Oxford Street, whose name has become so closely connected with parquet flooring, of which they were one of the earliest makers, if not the first in this country, had a variety of specimens of this work of their own manufacture, some of which struck us as being remarkably low in price; and now that the fashion of laying carpets over only a portion of the room seems to be becoming general in every class, a cheap bordering of this character, which undoubtedly tends to cleanliness, will be received as a boon.

Messrs. JOSEPH DAVIES AND CO., Kennington Park Road, London, and other places, show a variety of Admiral Fitzroy's Prize Medal Barometers, of which they are the inventors and sole manufacturers, their works being named after that gentleman. The Royal Polytechnic Barometer, in which is incorporated the whole of Admiral Fitzroy's ideas, was also prominent in the display. This appliance has attained great celebrity, and has been awarded upwards of thirty gold and silver medals, as well as other prizes and commendations. The dial has separate readings for summer and winter, and the simple manner in which indications of approaching weather are obtained is



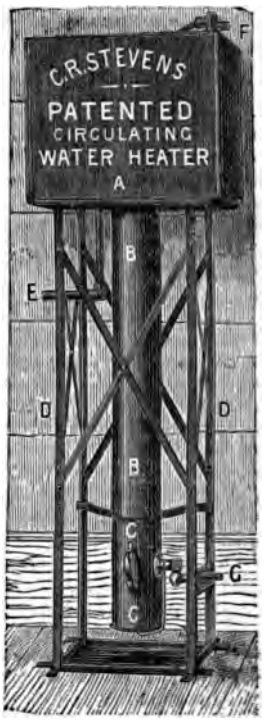
its great feature. For instance, all that is necessary is to set by means of the key, the small index pointing next the tube to the top of the mercury. The long hand will move at the same time, and point to the weather most likely to follow, in the outside column for winter, and the inside column for summer, the dividing point between summer and winter being marked on the thermometer below. Another great advantage is that after it is set, and the key removed, it is impossible, either by tapping or knocking the instrument, in any way to alter the readings. So confident are the makers of its efficiency, that they allow one month's

free trial of the instrument to any person prior to payment. Messrs. Davis also exhibited a variety of Thermometers, amongst which were several adapted for ovens and manufacturing purposes.—Aneroid Barometers, Pedometers, Pocket and Mariner's Compasses, and an ingenious little invention, the size of a watch, called a Damp Bed Detector, which provides an immediate and infallible detector of damp, and should prove invaluable to travellers, tourists, etc.—The Wealemefna or Watch Guard Pendant Measuring Instrument supersedes the rule and tape for all ordinary purposes, and will measure the distances on charts and maps with unfailing accuracy. Messrs. Davis and Co.'s Lactometers are unerring and cheap, and one of their most recent inventions, is an ingeniously constructed Pocket Draining Level, perfectly accurate, which may be fixed for use on a walking-stick. The upper plate carries a spirit level with adjusting screws. A graduated sector of 90 degrees allows the instrument to be set to any angle, and a cramping screw fixes it in any position. Crossed horse hairs, which are easily renewable, are provided for the field sight, and are sufficiently fine for the purposes to which it is likely to be used. In the other sight, the hole is made larger than usual for affording a large field and so facilitating observation. Their A. B. C. Water Testing Apparatus, contained in a small box, with sufficient solutions for 1000 tests or experiments, is one of the most valuable appliances in the market for that purpose, and should be in the possession of every person interested in that important question. The rest of the exhibit is made up of the general class of optical instruments, spectacles, etc.

The BRITISH SANITARY COMPANY, represented by Messrs. SHARPE & Co., Holborn Circus, exhibit the form of Earth Closet of which they are the Patentees. A reference to the illustration will explain the nature and working of this closet. A is the magazine for containing the dry earth or other deodorising material used; B and B^1 are the sustaining pieces to bear up the weight of the material, and also form the regulating orifice; C is a bevelled shelf,

which is lined with a metallic plate, and carries in front an iron frame or mouthpiece, through which the perforated shovel or spreader, D, travels. The action is communicated as follows:—When the closet is being used, the seat is depressed about an inch, forcing down the rods, E E, on each side of the seat, which raise the long and weighted end of the segmental toothed levers, G and G, which in turn throw back the long end of the lever, H. This *duplex action* is coupled by the cross-bar, J, to which is attached the shovel, D. This is then withdrawn to the back of the bevelled shelf, C, and receives the charge of earth, etc. When the seat is relieved, the weight of the levers brings out the shovel quickly, thus spreading the earth, etc., over the excreta. It is so arranged that the parts are easily accessible, and a door at the back is provided for removal.

Mr. C. R. STEVENS, Loampit Vale, Lewisham, S.E., shows a new patent apparatus, by which a combined mixture of steam and hot air, suitable for heating any description of building, from the smallest to the largest, is equably diffused by means of the ordinary coil of pipes, or is carried round the apartment, as circumstances may seem best. It is constructed to supply a great amount of heat with a small amount of fuel. The construction of the apparatus or heater is as follows:—A small quantity of water is kept supplied to the copper reservoir above the gas or lamp inside the iron casing, by a supply cistern with a ball valve to regulate the supply, or a self-acting reservoir with stand, which is connected to the heater by a pipe, and when lighted the heat from the lamp, gas, coke, or coal causes the small quantity of water to be generated into steam, and the heat from the fuel, together with the steam, is driven through the under and back again along the top pipes, from which is carried a small pipe to the chimney, or outside of the building, to take off the particles of combustion. The heater can stand inside or outside the structure; there is no possibility of any particles of combustion entering the buildings or dwellings. The advantages of this apparatus are, that when heated by gas no smoke accrues; there is no danger from explosion, as there is no boiler to burst; and no trouble or attention is required but once a day, therefore a great saving of labour is effected. Mr. Stevens' arrangement is certainly novel, and appears as effective as it is novel, and the danger of having the hot air burned is entirely guarded against by the admixture of the steam.—Mr. Stevens' Circulating Water Heater, for supplying hot water to baths, and for general domestic purposes is simple and ingenious. By the accompanying drawing it will be observed that A is a galvanized tank for



holding hot water; B B, iron flue casing and copper boiler inside; C C, gas burner; D D, iron stand for supporting tank and boiler; E, outlet pipe from tank, for supplying water to any part of the house; F, cold water connection; G, gas connection. The gas is brought up through two concentric tubes, air being admitted through the opening of the inner tube, an atmospheric burner being thus formed. The apparatus is substantially constructed, the boiler being made of copper, and the casing of stove in stout sheet-iron. The circulating tank is supported on an angle-iron stand,

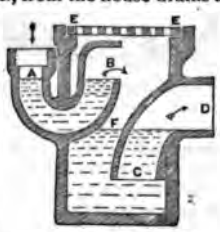
and the whole of the apparatus is connected together ready for fixing. It can therefore be fitted to a house by the builder, and cased in with wood, with a door in front for lighting the gas. It can stand on a landing, box room, etc., or any upper part of the house, from which position the draw-off pipes to bath, hand basins, or sinks can easily be taken. All are provided with an escape pipe for taking off the particles of combustion. ¾ or 1 in. pipe is required from the hot water tank to the bath and ¼ or ⅜ pipe for the basins or sinks, or the apparatus can stand in the bath rooms or other convenient place and remain the property of the tenant. When the tank is covered with felt after turning out the gas at night, the water remains hot enough for the bath in the morning without any further expense. Cost of gas for a bath at 95 deg., ¾d.; cold water taken at 50 deg. Time about 30 minutes. The gas can be kept burning all day at a cost of 4d. to 6d. per day, according to the amount of hot water required.

Mr. HENRY NEWMAN and Mr. S. J. NEWMAN, architects, Northampton, exhibit a map, showing a scheme for supplying London and other places in the Thames Valley with a good supply of water, of which the following is a description. It is proposed to collect the water from the highest portions of the Thames water-shed, whereby a good supply of pure water may be obtained comparatively free from the contaminations and impurities found in surface or river water, if taken or collected at low levels (as is done in too many cases). The blue line shows approximately the line of the conduit proposed to be at the level of 300 ft. above datum. This would collect the supply of water from numerous springs and streams all along its course. The conduit would be a tunnel kept at convenient depths below the surface save in some places where it would come to the surface of the ground. There would be regulating valves at most in-takes. The northern tunnel terminates at Chipping Barnet Common, on the north of London, and the southern tunnel, between Merstham and Gatton. From reservoirs at each of these points the water would be conveyed in iron pipes to suitable points for connection with the present pipes, so distributing the water by gravitation, throughout London and suburbs. The water would be forced up to the few parts higher than the conduit (such as Highgate, Barnet, etc.), by hydraulic rams and motors (such as those made by Bailey and Co., Salford) worked by the water flowing to lower parts, so entirely avoiding steam pumping. The map does not show all the details of the scheme; in some places the conduit would follow the contour of the ground more closely than there indicated. There would also be tributary conduits in certain places; also storage reservoirs for storm water, etc. In its completed form, provision would be made for the supply of every place requiring it within the Thames water-shed.

The SANITARY ENGINEERING & VENTILATION COMPANY, Victoria Street, Westminster, exhibit several of their specialities, foremost amongst which are their 'Imperial' Ventilating Tubes for the admission of fresh air without draught, and free from 'blacks' or dust. They are made in a variety of forms and sizes, and can be made quite ornamental in appearance. The most recent form in which these appliances are offered is as an ornamental bracket, having openings by which the air is admitted. Inside the bracket is an air-cleansing water-box, and in this, ice, scent, or disinfectants can be placed at pleasure; at the same time the bracket may be utilised for holding an ornament, etc. 'Weaver's' Exhaust Ventilators in several forms and sizes are also shown, as well as several others, and their 'Imperial' Aerating Filters for cisterns, etc. One of the great recommendations of these filters is, that every part of them is accessible for cleaning. The filtering medium employed is silicated carbon, both solid and granular. Arrangements are made for its aëration, so that water has not the flat and insipid taste when passed through it, which is sometimes found in filtered water, and special provision is made for effectually cleansing the carbon cake. As a portable filter, this apparatus appears to answer the necessary requirements as well as most now in the market.

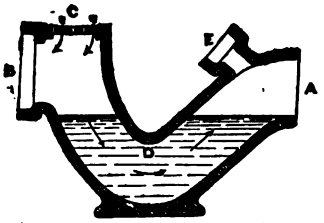
The exhibit of Messrs. DOULTON and Co., of Lambeth, is of a varied character, and consists of the various articles of stone, sanitary ware, terra-cotta, etc., interspersed with several specimens of fine hand-painted plaques, medallions, etc., as well as many examples of the celebrated Doulton ware in articles of domestic utility. Amongst the former class we may mention Terra-Cotta, red and buff hard burnt, showing the action of flame, and avoiding the even chalky appearance which gives such tameness to the work. Good terra-cotta should show the flush of the fire, it then has an appearance entirely its own, and cannot be mistaken. Imitations of stonework, or worse still of plaster, should be avoided in terra-cotta. Balusters, Bosses, and Tiles, in Doulton ware, for exterior or interior decoration, Imperishable Faïence Tiles, as well as Doulton ware, being all hand-work. Doulton Ware Vases, Jardinieres, etc., etc. Stoneware Traps; Mansergh's; Latham's; Lovegrove's; Reversible; Interceptors and Grease Interceptors; Stoneware Sinks; Doulton's Patent Joint; Stanford's Patent Joint; Opercular Pipes; Irrigation System, are shown. We may particularly mention the No. 6 Lambeth Valve Closet, so arranged that it can at once be screwed down to the existing floor, and being self-contained requires only two joints, one to the supply-valve, and the other to the soil-pipe. By this means the cutting away of floors and trimming of joints are obviated, while the cranks, surface boxes, and similar complications, which, under existing circumstances oftentimes render the fixing of a closet more expensive than the closet itself, are entirely done away with. The Lambeth 'Trapless' Closet is also deserving of notice. The basin is made with a very sharp inclination to the outlet, and the flushing arm is so placed as to render it impossible for anything to be retained, and the general construction is such, that the usual complication of levers, both for the supply and discharge valves is dispensed with, as both are worked by the same spindle with direct action at each end, and a very small weight is sufficient to render the discharge-valve tight. No. 14, or the Lambeth Improved 'Flush-Out' Closet, is a simple, efficient, economical, and durable article, and it is fitted with a socket for inspection or ventilation. The object sought to be obtained in this closet, is to effectually drive the soil and paper from the basin, to get the greatest amount of water to remain in it, and at the same time to offer the least resistance to the action of the flush. There is a variety of Water-Waste Preventers, constructed on the best principles, high pressure ball-valves, bath-locking apparatus, lavatories fitted up with Doulton and Faïence decorations, a skeleton lavatory, and Bailey Denton's and other filters.

Messrs. JAMES STIFF & SONS, London Pottery, Lambeth, exhibit an interesting collection of Sanitary Stoneware, Water Filters, Medical and Chemical Apparatus in stoneware, Plain and Ornamental Architectural Terra Cotta in buff or red, Architectural Lambeth Majolica, and Adamant Terra Cotta Spandril Steps. From amongst the exhibits we select for illustration the New 'Weatherly' Disconnector Waste Water Trap (Registered), for completely disconnecting and trapping the waste pipes of sinks, baths, lavatories, cisterns, etc., from the house drains and public sewers.



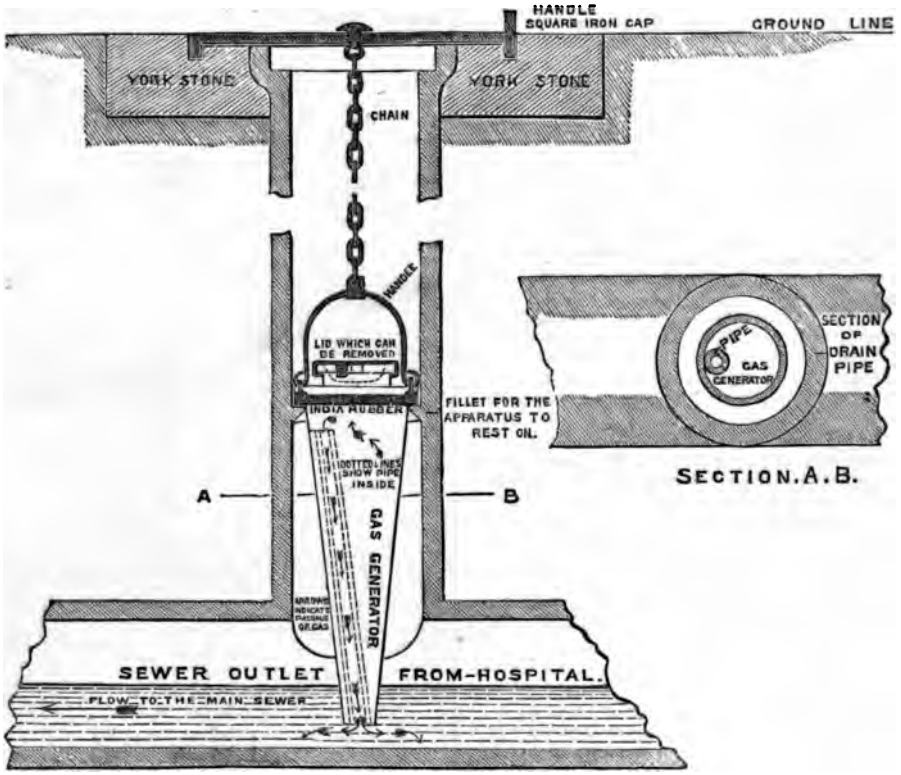
The especial advantages of this trap are: perfect disconnection from house drain, easily cleansed syphon trap to waste-pipe, efficient and accessible grease trap, waste-pipe discharge concealed from view, open yard gully, strongly trapped, and prevention of splashing and overflow. The two water seals are entirely separate and at different levels; the curves are perfectly easy and syphon shaped. There are no diaphragms to intercept free passage of the soil, etc. Trap is all in one piece with broad strong foot, so that it cannot

be set out of position. This trap is invented to carry out in drainage traps the principle of disconnection already applied to sinks, etc., by the 'Weatherly Disconnector Waste Water Trap', and is very economical in price. Weaver's Ventilating Sewer-Air Trap is also worthy of remark. It



has been awarded a certificate of merit by the Sanitary Institute of Great Britain, and has been highly commended by many medical officers and sanitary engineers. Soper's Hospital Drain Disinfector is another sanitary invention of considerable merit, and besides the use we illustrate, it is also applicable for portable uses, such as ambulances, manure heaps, etc., and for steamers carrying large numbers of passengers. Our illustration represents it as arranged for the complete disinfection of hospital sewage before its junction with the public sewers, accomplished by the continuous generation of chlorine gas in immediate contact with the sewage matter. By this invention the mephitic air in hospital drains is disinfected as completely as the sewage matter, and it is manufactured to suit drains of all sizes. This invention is in constant use at Stockwell Small-Pox and Fever Hospitals and elsewhere. For the remainder of Messrs. Stiff's exhibits we must refer our readers to the catalogues which the firm distributed from their stand.

Messrs. THOMAS SMITH & Co., Canal Potteries, Old Kent Road, have a good collection of Sanitary Stoneware, comprising most articles usually classified under that head. One of the principal features in the exhibit is Herbert J. Jones's Patent Drain Pipes, the principal advantages of which are, that they are made 2 ft. 6 in. longer than the ordinary drain-pipe, and at the socket end of each is a plain saddle-shaped cap, fitting into a corresponding opening in the pipe. By this means examinations or junctions may be made at any time without let or hindrance to the performance of the functions of the drain, and no overflow of sewage will take place during the execution of such works; neither is the gradient in any way disturbed. This is worthy of especial attention, as, in the usual manner of making connections, a hole is either knocked in the side of the pipe for the insertion of the end of the intended subsidiary drain, or several pipes are displaced to allow a junction to be put in, during which operations the sewage escapes into the open trench. The latter method is almost as objectionable as the former, inasmuch as the work cannot be performed without chipping the ends of the pipes, thereby causing short bearings and imperfect joints. It is an acknowledged fact that a line of sewer once disturbed for this purpose, cannot be again thoroughly restored. By the removal of the plain cap at the socket end of the pipe, and by substituting a junction cap in lieu thereof, a connection for a subsidiary drain is most simply and effectually made. The caps, being flanged all round, afford opportunities for stopping and making these, as well as the socket joints, sound and tight.



When the drain is first laid, the apertures for the caps offer every facility for making the internal joints smooth and perfect, and these need not be again disturbed.

The SILBER LIGHT COMPANY, Whitecross Street, E.C., have a collection of their lamps for burning mineral oil, with the well-known patent burners of Mr. Silber, which have been described on a previous occasion in the SANITARY RECORD. A number of improved gas burners of Mr. Silber's invention are also shown, as well as a new stove for burning mineral oil, constructed on new and interesting principles.

Messrs. J. and M. CRAIG, of Kilmarnock, who are represented by their London agents, Messrs. John Finch and Co., Buckingham Street, Strand, exhibit a collection of their specialities in drain-pipes, tiles, bricks, etc., including Buchan's Patent Drain-pipes and fittings, Buchan's Grease Traps, and the Improved Drain-pipes of the same

inventor, that are too well-known to require further comment. There are some good examples of white and coloured glazed bricks, and a variety of other articles of a kindred character, and Messrs. Finch and Co., show a very handsome porcelain bath and fittings, etc., with which their name has become so intimately connected.

Messrs. STRODE & Co., Osnaburg Street, N.W., in a tastefully fitted erection, exhibit some high-class examples of London made Gas-fittings and other brass work, including their well-known Sun-burners. They also show an improved Bath Heater of simple construction, capable of providing a bath at 110° in half an hour. This Bath and Heater can be placed for use in any room to which a supply of cold water can be conducted; any existing cistern, as long as it is at a higher level than the top of the heater, can be made available. The only other requisites are a gas pipe for the supply of the burner, and a waste-pipe for emptying the bath. The advantages of this system are portability, simplicity, and cleanliness. The water runs through the heater without coming in contact with the products of combustion of the gas, and any required quantity of pure hot-water can be obtained, from a single quart (boiling) in a few minutes, to a bathful (110°) in half an hour.

THE PORTABLE GAS APPARATUS COMPANY, 47, Millbank Street, Westminster, S.W., exhibit their Portable Gas Machines, for making gas from mineral oils. They are simple, effectual, safe, and strong, give a great pressure, make gas of a high and uniform quality, give a steady flame, deliver a large amount of light for the rating, occupy small space, require no lubrication, and are said to be less liable to require repairs than any other gas machine in the market. There is no clockwork arrangement in a tin or sheet-iron casing, which, when out of order, would require skilled workmen from the manufactory to put in repair. The only moveable part about the machine is an ordinary steam regulating cock, which can be seen while the apparatus is working, and is not at all likely to require any repairs. They are made entirely of cast-iron, copper, and brass, neither tin, soft metal, nor solder being used in their construction. Being in every way perfectly self-acting and self-supplying, and the production of the gas regulated by the consumption; requiring no attention whatever after they are started (which does not occupy more than a few minutes), there is not the slightest danger in working, and a servant of ordinary intelligence can manage them. Neither gas-holder nor purifiers are required, and all waste refuse and nuisance is entirely avoided. The gas manufactured by this apparatus is suitable for all purposes to which coal gas is applied. It is obtained from gasoline (a perfectly pure hydro-carbon liquid) by the aid of heat generated by the machine itself. The gas does not deteriorate after working the machine any length of time, it is of great purity, and does not give off in burning any of the sulphur or ammoniacal impurities so injurious to pictures and decorations; neither does it consume so much oxygen from the atmosphere as the ordinary coal gas, and is made without nuisance or trouble, and at a comparatively small cost.

Messrs. J. WEEKS & Co., King's Road, Chelsea, show their Warming and Ventilating Appliances, which can be adapted to any character of building. This coil, which is for use in connection with any ordinary hot-water apparatus, may be described as follows:—It is in appearance like an ordinary hot-water coil, except that the pipes are vertical instead of horizontal. It consists of upper and lower water-chambers connected by vertical pipes. Through the centre of each hot-water pipe runs a smaller air pipe, open at the two ends, so as to admit cold air from the outside, warm it as it passes through the hot-water tubes, and discharge it thoroughly warmed into the room or building. At the top, the air-pipes are continued about one-and-a-half inches into a chamber, the open top of which is covered by an ornamental iron grating. The lower box or chamber is connected by a zinc tube or other channel with the external air. It has also flaps or doors for opening into the house or room. The effect of this arrangement is, that when the apparatus is in operation, the heated external surface of the coil (or part seen) warms the air of the room in the ordinary way; but while this is going on, the air in the small inner pipe becomes rapidly hot, and naturally rises quickly into the chamber, and thence through the grating into the house, drawing in its course a constant current of fresh air from the outside, which in its turn passes through the coil, and becomes warm before entering the room. By this means, from 900 to over 2,000 cubic feet of warm fresh air are introduced into the room by a coil of the size exhibited, in proportion as the temperature of the water in the apparatus varies from 120° to 165°. By means of the upper chamber, before mentioned, the air can be admitted dry, or rendered moist, at pleasure. This coil can be fixed to any existing hot-water apparatus. One of the chief merits of this invention is, that there are no tortuous channels, no fans or machinery for forcing in air in defiance of the laws of nature, as is generally the case in ventilators. This coil is admirably adapted for schools, churches, hospitals, prisons, halls, staircases, in fact all classes of buildings, whether public or domestic. It supplies a long-felt want, viz., a simple and satisfactory method of introducing warm air into buildings without draught.

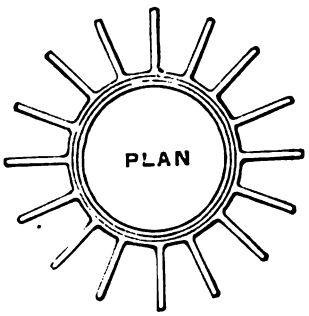
Mr. ROBERT RENTON GIBBS, of Liverpool, displays his system of Hot-Water Heating Apparatus, effected by a boiler in the basement, and coils conducted throughout the building.

Messrs. MUSGRAVE & Co., Limited, of New Bond Street and Belfast, have a handsome collection of their Patent Slow Combustion Grates and Air Warmers, which have been before the Public for some time. They are adapted for every variety of room, as well as for factories, workshops, or cellars. Some of them are of most elaborate construction, and ornamented with tiles, etc. They also exhibit a new Smokeless Stove Grate called the Ulster. The grate is very similar in appearance to a well-designed register stove grate of the usual make, and, in addition, it is provided with a chamber for holding fresh fuel, which replenishes the fire as it burns away, but cannot become ignited until it reaches its proper position in the fire-place. When the grate is in operation the supply of fresh coal is gradually parting with those constituents which form the heavy black smoke so often seen rising from our chimneys, and these highly valuable products, which in ordinary grates escape into the chimney and are lost, are in this grate retained by intercepting traps and made to pass through the burning fuel, and are thus consumed, adding immensely to the heating power and brilliancy of the fire.

THOMAS WALLER & Co., 47, Fish Street Hill, E.C., exhibit several good and useful apparatus, one of which is their Patent Cooking Stove, constructed with one or two boilers and ovens for supplying steam for cooking purposes and hot water for bath, scullery, hot linen closet, etc. When a house is required to be warmed, T. Waller & Co. fix their patent warm air generator at back of the stove in the space usually occupied by brickwork in forming the flues, by this means the whole house is warmed by one fire. As a kitchen range is used all the year round, being lighted first in the morning and kept alight the last in the evening, it will be seen that this is the simplest and cheapest plan of warming the house, the first being the only cost. Warm air ventilators are fixed so as to turn the warm air on when required. A current of warm air can thus be supplied day and night, keeping the house always warm. Another useful invention shown by the firm is their Patent Fire-Contracting Stove, by which the fire can be increased or diminished at pleasure, without the least trouble or delay, by one of the most simple contrivances possible, viz.:—the ordinary poker; by this simple invention, all those unsightly contrivances made use of to lessen the fire-place, such as false backs, false bottoms, false cheeks, fire-balls, and fire-baskets, are entirely superseded. This is effected by means of sliding cheeks protected by an iron box, so that they cannot be disarranged by the bricklayer in fixing. They exhibit, in addition, their Patent Ventilating Apparatus, the object of which is to thoroughly ventilate water-closets. It prevents the entry of sewage gas and other offensive smells into the dwelling through the water-closet. By fixing a tube or duct at the back of the water-closet, with an open mouth extending above and below the seat, the sewage

gas, which enters the closet through defective joints in soil-pipes or syphon-pipes (which frequently become dry) is entirely carried away by the ventilating shaft, through and above the roof of the house. The flap, or cover, being fixed on an incline, acts in the same manner as a blower to a fire-place. This ventilator is equally suitable for hospitals and sick rooms, by connecting the ventilating tube with the chimney or fire-place.

The THAMES BANK IRON COMPANY, Upper Ground Street, Blackfriars, S.E., have an excellent display of various kinds of Hot-Water Apparatus, including Pipes, Coils, Connections, Boilers, etc. One of the most notable features in this Exhibit is their Improved 'Base-Burner Gill Stove'. We append three illustrations of this stove, show-

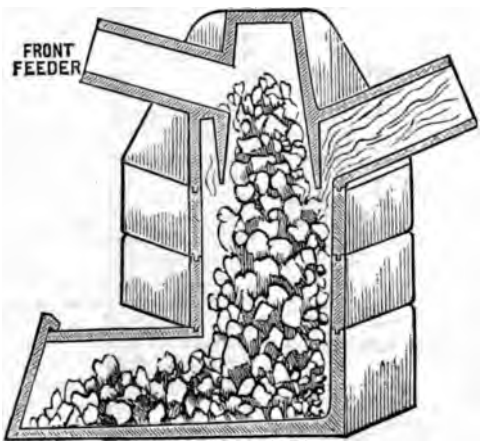


Ring Segment.

ing plan and ring segment, elevation, and sectional elevation. By a simple arrangement of casting it is built up in

Elevation.

segments (three or more according to required power of stove), each fitting in a perfectly air-tight joint. The castings supporting each other from the base upward require



Sectional Elevation.

no bolts, and are free to expand, when heated, without injury to the stove. The heating surface of the gills is very great; a 12 inch stove, 3 feet 6 inches high, containing 50 superficial feet, and the gills being vertical on the body of the stove, give off the heat very rapidly, and being so placed they intersect and the more readily diffuse the current of heated air passing through them. The smoke flue can be carried off in any direction to suit the convenience in setting, and the opening into smoke flue is protected by an internal flange. This flange also prevents combustion higher than the opening of smoke flue; and the top casting being elongated forms a reservoir, supplying fuel as that under is consumed. The stove is fed from the top or the front as may be required—simply throwing in the fuel to fill it, and there is no danger of choking the smoke flue, or interfering with the working of the stove. No fire-bars or dead-plates are required, the fire burning on a plain base, the ashes being easily removed through a nozzle in the base-piece, having a sliding door fitted, and by this, and with a damper in smoke flue, the draught is regulated. When properly set the liability to burn the air through inattention is reduced to a minimum, inasmuch as the greater the heat of the surface of gills so much the more rapidly is the air impelled through the stove, and the area of gills exceeding that of the fire-box—in the proportion of nine to one—it will at once be seen that the temperature of burning fuel is rapidly reduced, and given off into the building. Freedom from all fire hazard is a valuable feature of this system, and a further recommendation is its very moderate price. The Company also show an Independent Vertical Steam Boiler, made of the best Staffordshire plates, 42 inches by 24 inches, with 5 inch cross tubes in the fire-box, well made and fitted, at a remarkably low price. There is a new Slow-Combustion Stove, with some very meritorious points, and considerable economy in burning; and tubular and saddle boilers, etc. In addition to these a new cast iron Ornamental Skirting for hot-water pipes is exhibited, which will prove an addition to the appearance of the room. One of the most recent establishments fitted with this arrangement is the United Arts Gallery, New Bond Street.

Mr. HARRY HUNT, of 117, Newington Green Road, London, N., exhibits the celebrated Crown Jewel Base Burner Warming Stove, specially constructed for burning anthracite coal, coke, and other smokeless fuels. This stove is now made with improved arrangement for admitting fresh warmed air, also a ventilator fixed in the chimney, to take off the over-heated or vitiated air, by these means rendering it a purely sanitary stove, and one that can be recommended for maintaining equal temperature in dwelling-houses. If placed in the hall it will warm the house throughout to any required temperature, night and day through the winter, as it burns continuously, and only requires feeding about every twelve hours with fuel. The Crown Jewel is the only stove hitherto produced that efficiently and economically burns the anthracite smokeless coal. One of these

stoves, with about twenty-five pounds weight of coal, will warm a building, containing about 20,000 cubic feet, to a temperature of 65 degrees in winter weather for twenty-four hours, which cannot be done with five times the weight of bituminous coal burnt in ordinary grates. This stove is elegant and cheerful in appearance; the grate is enclosed with talc windows, which admit of the fire being seen burning. The parts in contact with the fire are made of a superior kind of iron, that will stand the continuous intense heat of the anthracite coal. These stoves are now being made in all sizes to meet all requirements.

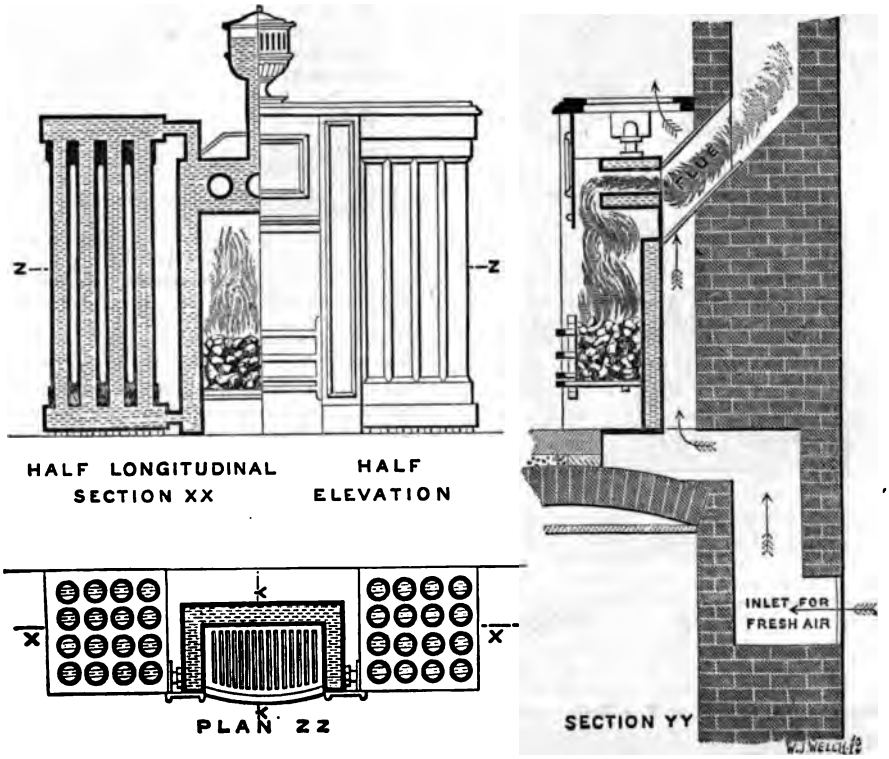
Mr. GRIFFIN, 69, Fenchurch Street, exhibits his Patent Ventilating, Heating, and Smoke-Consuming Register Stove, constructed to burn coal, coke, or anthracite, and which can be applied to any style or design. An air-chamber is formed by covering in the recess behind the grate with an iron plate; fresh air is introduced into it, which takes up all the heat radiated, and passes warmed into the room through a ventilator, rises to the ceiling, thence descends to the fire, and passes into a separate air-chamber, becomes superheated, and is delivered in jets into, around, and over the fire, and enters the pipe into the chimney. Perfect ventilation is effected by the continuous

ation and renewal of a larger volume of fresh air than ther grate, warmed (not superheated) before entering oom. It can, if desired, be employed to medically ate or disinfect an apartment, which can be kept equal temperature throughout. There is a more mical consumption of fuel, the smoke is consumed to imum; further, a smoky chimney becomes an im-bility. The glowing heat, and bright and cheerful rance of the fire, is a special recommendation, as it ces the greatest amount of radiation it is possible to

OKE-CONSUMING REVOLVING FIRE-GRATE, H. N SNELL'S patent, No. 5195, 1880. This invention r its object an improvement in the construction of fire-

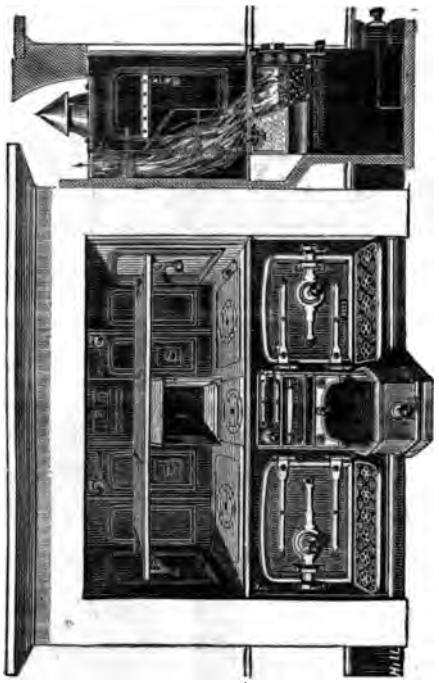
, whereby that portion containing the coal or other fuel sed to revolve upon a pivot, and in such manner that the when placed upon the top of the fire, is, by the inversion of the grate, brought undermost, and thus the products of combustion are more perfectly consumed before being discharged into the open air. Many mechanical contrivances have been brought before the public of late years for effecting this object, but all of them are more or less objectionable from the complication of their parts, whereas the simplicity of the arrangement secured by this patent is very obvious. The arrangement by which the gratings alternately forming the lower part of the grate are opened for the purpose of placing fresh fuel upon the fire is of a very simple nature, and can easily be manipulated with an ordinary poker. Particulars of this stove may be obtained of the manufacturers, Messrs. Potter and Sons, of 298, Oxford Street, W.

MESSRS. J. F. FARWIG AND CO., Queen Street, Cheapside, are exhibitors of George's Patent Calorigens for heating buildings by means of gas, or with coal or other fuel. The principle of both stoves is somewhat similar, excepting that in the one a gas burner is provided, and in the other a fire-box. These stoves are well-known to most of our readers. The internal arrangements of the gas stove will easily be understood. In rooms or buildings where a chimney is not available, two holes must be made in the wall to allow the pipes to pass through. The cylinder is to be attached to the ends of the pipes with the open end *upwards*. On lighting the gas the action is as follows: The products of combustion will leave the stove by the upper pipe, and be discharged into the cylinder; at the same time a current of air will pass down the cylinder, and through the lower pipe, supporting combustion. One end of the pipe, for the supply of fresh air, is to be inserted in the opening at the bottom of the stove, while the other end is carried either through the floor or wall, to communicate with the *external* air. Where an ordinary fire-place is used, the opening may be closed by a thin sheet-iron plate, or otherwise, but in such a manner that there may be no openings round the edges for air to pass, and thus interfere with the draught of the stove. The importance of this point is too often overlooked by those employed to fit up grates and stoves. The coal stove is similar in construction. The pipe containing the damper is to connect the back of the stove with

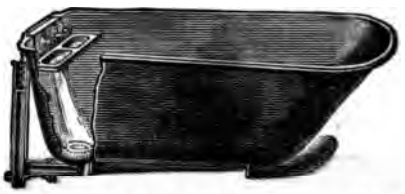


the chimney or flue for carrying off smoke. One end of the pipe is to be inserted in the opening at the bottom of the stove, while the other end is carried either through the floor or wall, to communicate with the *external* air. The fire in the stove heats the coil contained therein, thereby causing the air to rush in through the pipe and out at the opening, thus affording a constant supply of pure warm air, which, in its passage, rises to the top of the room, then spreads itself over the whole area, gradually descends towards the floor, and eventually passes away through the fire-box and up the flue, thus affording perfect ventilation to an apartment closely shut up in every other respect. When the stove is required for warming halls, passages, staircases, etc., it may be placed in any convenient position in communication with the part to be warmed. For example: place the stove in any room at the lowest part of a cold damp house, keep the door of this room constantly open, keep the fire burning in the stove during the day, and in less than a week the dampest house will be found to be perfectly dry, as a constant current of pure warm air, even in misty weather, will be flowing from the room to the top of the building, carrying away all moisture from walls, etc. The cost of fuel for the coal stove is about twopence per day.

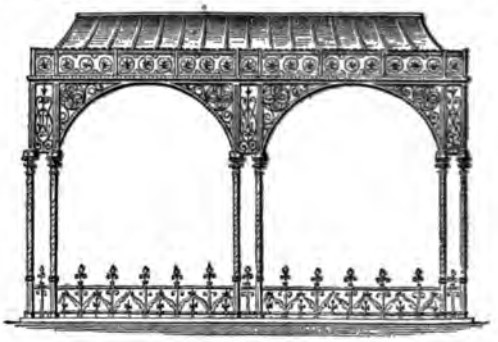
STEVEN BROS. & CO., Architectural and General Iron-founders and Sanitary and Hot-Water Engineers, 35 and 36, Upper Thames Street, London, and Milton Iron Works, Glasgow, have an extensive collection of their manufactures, consisting of Baths, Enamelled Iron with patent fittings, Coils for Hot Water, Coil Cases, Hot-air Stoves, Register Stoves, Slow Combustion and others, Lamp Posts and Lanterns, Urinals, Water Closets, Dry Closets, Lavatories, Ornamental Staircases, Kitchen Ranges—open and close fire, with all the latest improvements for economy and ventilation, including patent ventilator for carrying off all the smell of cooking; Railings and Grates, Finials and Weather Panes, Verandahs, Patent Hot-water Valves, Kitchen Sinks, Patent Drain Traps, Gully Gratings and Manholes, Stable Fittings, Rain-pipes and Gutters, Balusters, Hot-water Boilers, Pipes, and Fittings, and Columns. The chief features of their Kitcheners, one of which we illustrate,



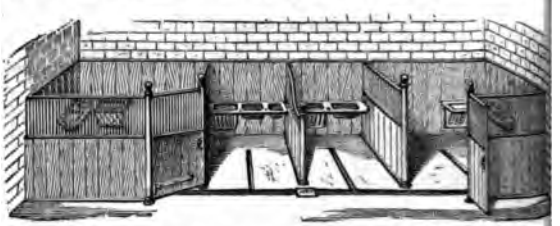
are—1. They contain a most perfect self-acting ventilator, placing it beyond the power of the cook or attendant to interfere with its action, thus doing away with the principal objections to kitcheners. 2. The little patent box-check, which is a perfect economiser, gives nearly double the heat with less fuel than is usually consumed in kitcheners, making it impossible for the servant to burn away the fuel unnecessarily, to the damage of the range. 3. These kitcheners are all fitted with ash-pit linings and return flue ends, the fire-place and back of ovens are also made up thus, being a considerable saving of labour and material in setting. 4. The hot-plate is made in parts, which enables any necessary repairs to pipes, etc., to be effected without taking the range to pieces. 5. They have swing brackets to allow the plate rack being folded back when not required. 6. Tile covings fitted in the most approved manner with screws, which admits of a new one being



inserted in case of breakage with very little trouble, and the bottom grate is loose and rests on a frame, and can be



replaced in half a minute without breaking away or disturbing the fire-place. This firm have received the first award for kitchen ranges at the Melbourne Exhibition. We also illustrate one of their improved cast-iron enamelled



baths, a verandah, and an example of their stable fittings, all of which are notable for good workmanship and finish.

Mr. JAMES HOWORTH, of Farnworth, near Bolton, sends samples of his Popular Exhaust Ventilators and Blowers. Mr. Howorth's inventions are well-known, and his ventilators were selected for the buildings of the Paris Exhibition in 1878. A recent addition shown here is an Exhaust Ventilator for mines, or large mills, which is equally as efficacious in its action as the original introduction for ordinary buildings, the Archimedian screw being the basis on which the arrangement is founded.

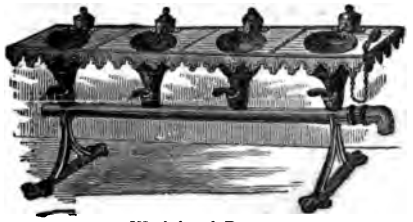
Mr. ROBERT ADAMS, Great Dover Street, Borough, S.E., whose name has been long associated with improvements in connection with doors and windows, exhibits several new inventions in this direction. Amongst these, a new window sash claims our attention. It is well known that numbers of accidents yearly occur in the cleaning of windows, and Mr. Adams having this fact before him, has endeavoured

to obviate the danger by introducing a sash that can be applied to existing windows at a comparatively small cost. To both upper and lower sashes a metal plate or tongue is fixed, and secured by simple mechanism. By placing a key in a hole in the sash frame, these tongues are shot forward into the window frame, which secures the sashes, and they can be lifted up or down in the ordinary manner to clean the outside of the window. The sash is unlocked, so to speak, by turning the tongues into the sash frame, the sash can then be swung, and the outside cleaned from the inside of the room. It is then replaced, thrown up, and the top one brought down and swung in the same manner, so that no steps are required for the work. This invention should recommend itself to all those in a position to afford such a safeguard against danger. A new secure sash fastener of simple construction is also shewn. It is fixed in a perpendicular position in the form of a segment of a circle, and is ratcheted. A lever with a tongue is drawn over this, and fixed in one of the teeth. Having several teeth, should anything such as dirt have accumulated, the window can, notwithstanding, be secured, as the tongue will be sure to lay hold of one of the teeth. A new cord-holder for venetian or other blinds, called the 'Toby', will be found a considerable improvement on existing modes for this purpose. It is automatic in action and combines cheapness and simplicity with security. Mr. Adam's Three-Catch Espagnolette Bolt, though not so new as the inventions we have just described, is nevertheless an improvement on that form

of fastenings which are so common in France and other continental cities, where what are commonly called French casements are in use. Of late years, these windows have been much on the increase in England, and the Espagnolette Bolt is now commonly used for them. It will be recollected that in the original, by turning the handle, a bolt is shot at top and bottom of the window, but by his invention Mr. Adams adds a latch in the centre of the window, on a line with the handle, and the three are shot simultaneously. This gives greater security, and prevents the windows from shaking. The Patent Secure Fan-Light Opener is an invention of a sanitary nature, of which an immense number has been fixed in various parts of the metropolis and elsewhere, and of which we append an engraving. They can be fixed to any form of fan- or skylight, can be made to open up or down, and inwards or outwards. The mechanism is of a most simple character, being composed, as shown in the engraving, of a crank, attached to the fan-light, one arm of which has a slot, up and down which the other arm works, connected with a single rod brought down by the side of the door, the opening or closing being effected by a simple handle or cog-wheel, working on an endless screw. No less than seventy-three of these appliances are fixed at the

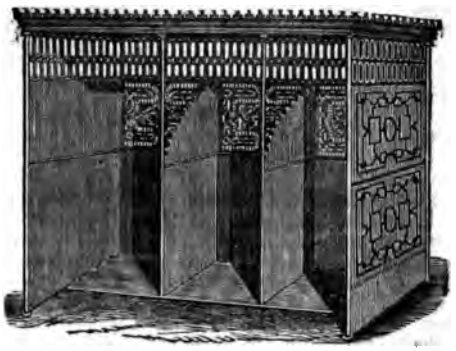
Lying-in Hospital, Old Street, where they are giving great satisfaction.

Messrs. WALTER MACFARLANE & Co., of the Saracen Foundry, Glasgow, whose architectural and sanitary iron-



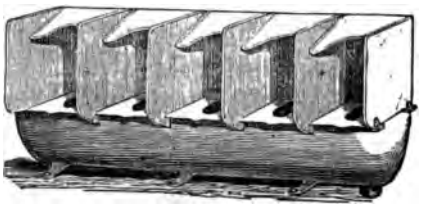
Wash-hand Range.

works have a world-wide reputation, are present with a few of their leading specialities in this class of work. They



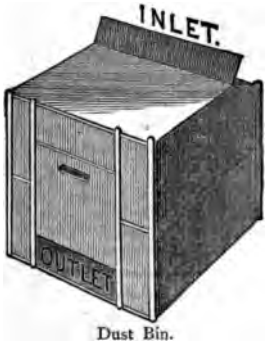
Urinal.

exhibit two ornamental screens, about 16 feet high, that may be adapted to various purposes. There is a handsome ornamental circular urinal, with a large lamp on the top, another of the plain ordinary character, a row of public water-



Water Closet.

closets enclosed in ornamental iron casing, another set open, their patent domestic dust-bin, examples of lamp posts, with public fountains attached, a large circular cattle trough, with dog trough underneath, and handsome lamp pillar and lamp

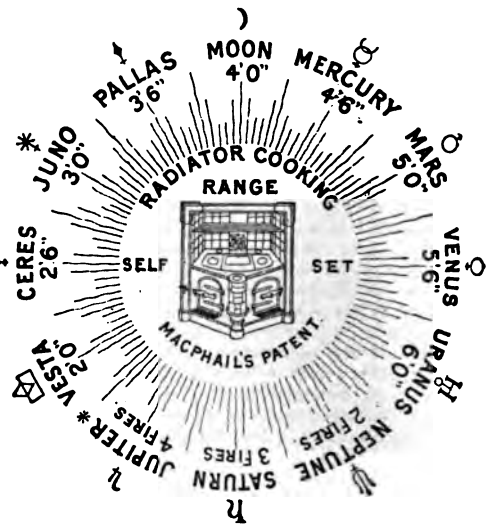


Dust Bin.

springing from the centre, and other horse and cattle troughs of a plainer description, lavatories, etc. There is, in addition, a variety of public fountains, from the simplest to the most ornamental in character, and we may fairly say this exhibit stands alone in its leading characteristics.

Messrs. YOUNG & POSTANS, 35, Baker Street, W., exhibit, amongst other chemical and pharmaceutical preparations, will include the following for antiseptic and sanitary uses:—Thymol, Thymol Solution. The new antiseptic Resorcin. Resorcin is a diatonic phenol extracted from certain plants, as assafœtida, and produced synthetically by the action of potash on chloro-phenyl sulphuric acid. Resorcin is soluble in almost all proportions in water. Carbolic Acid Gauze, Carbolic Acid Lint, for surgical dressings, Permanganate of Potash, and Salicylic Acid (pure natural).

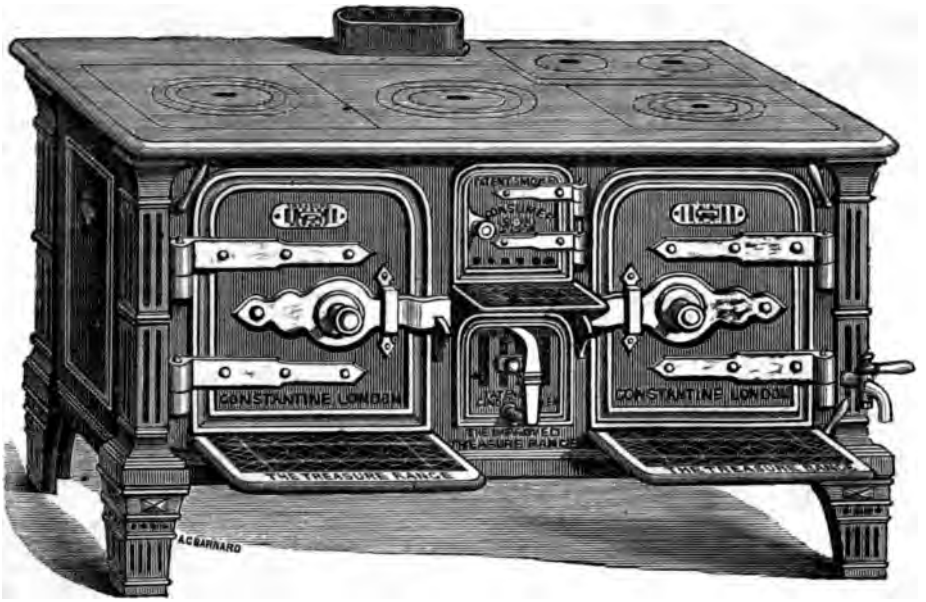
The 'RADIATOR' RANGE COMPANY, Bo'ness, N.B., and 43, Cannon Street, E.C., exhibit their new Kitchen Range on the principle named above. We append an engraving, shewing the range in a small size, and it will be observed it is different in shape to any existing kitchener. The fire-box is circular, and extends outwards, the ovens on either side receding slightly inwards at an angle, but both being well beyond the front framework of the range. Behind the fire-box is a boiler, which is larger in all cases than can be obtained in any other range of the same size. By lifting off a plate over the boiler, and on a level with the hot plate, we discover a square shallow fire-box for grilling, and by removing a door at the back of this, a commnnication with the flue is obtained, and a small opening on each side of the front fire-box admits draught to the grilling fire. The dampers or valves, instead of being at the back of the hot plate, as in all other ranges, are here fixed in the front, near the bottom, so that a servant has not to reach over a hot range to draw them in or out. It is claimed for this range that, owing to the circular shape of the fire-box, and the heat radiating in all directions, that three separate roastings can be carried on simultaneously in front of it, thus leaving both the ovens perfectly free to be used for baking pastry, etc., or as hot closets, and the heat can be turned off one or both of these as required. The fire can also be regulated to a nicety by means of sliding doors, and only one flue is required for the whole, thus materially economising time in cleaning, and preventing choking. It practically burns nearly all its own smoke, and



a great recommendation is the small quantity of fuel it burns, the inventor, Mr. Macphail, confidently asserting that 8 cwt. of coal will last as long as one ton in most other ranges. The Radiator range requires no setting, having merely to be placed in the opening provided for such articles. Grates for sitting rooms on the same principle are now in course of construction, and will shortly be ready for sale. At the exhibition in course of organisation by the Fog and Smoke committee, we shall have an opportunity of seeing these novel grates.

Amongst the kitchen-ranges an old and valued favourite is to be seen. This is the 'TREASURE' RANGE of Mr. CONSTANTINE, of Fleet Street, which has recently undergone several important improvements. The 'Treasure' Range has been before us for many years. It is of the 'independent' character, and requires no setting, and except from the fact that it stands on short legs, there is little difference in its appearance from that of an ordinary close fire range. Intended to be placed in the usual opening of a kitchen fire-place (although it may be stood anywhere most convenient to the user), the advantage of having it open at the bottom is that dust and dirt, that must in time inevitably collect in all ranges, that are not set in brickwork, can be constantly swept away. The fire box is small, the cost of fuel is of the very lowest, and anthracite coal burns in it in excellent form. The heat can be regulated to the greatest nicety, and it may even be used on the slow-combustion principle. It will effectually cook everything that the largest and most costly range can accomplish, and it is made from a small size suitable for the artizans' dwelling to those adapted for the largest hotel or public institution; and it can be arranged to supply hot-water all over the household. We give an illustration of one of these ranges with double oven, back, boiler, etc. Mr. Constantine starts upon the principle, no longer a theory, that to obtain the greatest heat from a given quantity of fuel, while providing proper ducts for its eventual discharge into the chimney, this heat should be arrested in its progress around the ovens and boiler in every practicable manner, ere its final exit takes place. The improvements we have mentioned consist in admitting, from every possible point, constant currents of cold air, which, becoming warmed in their progress, is at last discharged in a highly heated state over the fire, where, combining with the smoke, the nearest approach to perfect combustion takes place, and the products that find their way into the chimney are devoid of soot, and comparatively harmless. To carry out this, Mr. Constantine adopts a loose corrugated fire-box, with an

interstice or chamber around the three sides, with small openings at bottom and top. Underneath this are the fire-bars, elongated and feathered at their lower points, the centre one being tubular, for the purpose of receiving and distributing a constant supply of heated air. Under this again is a flat plate, perforated at the sides to corresponding openings in the corrugated fire-box; and this arrangement provides a heating chamber between the two. The air is admitted from the front, below this plate, and after passing



through the chamber before mentioned, becoming hotter and hotter every moment, and one current being sent through the centre tubular fire-bar, it enters the chamber of the corrugated fire-box still increasing in its volume of heat, and is discharged over the top of the fire to mingle with the smoke and rob it of all its impurities, etc. But a still further supply of fresh air is introduced through the medium of the fire-door, the improvement in which has been made the subject of a separate patent, and although only taken out for the small requirements of a kitchen range may, in our opinion, be utilised in its present or a somewhat similar form for the largest furnaces. This door is formed as a kind of box with triple chambers, the upper portion being about double the thickness of the lower part, and projects in this form into the fire. Air is admitted through a row of small holes at the bottom, and travelling upwards through a series of grooves in the first chamber is admitted into the second through two small openings, which it descends, and is then admitted to the third, up which it has to travel over a quantity of zigzag projections, which may be likened to small diaphragms, each one arresting its progress for a time, until having passed them it enters the wider portion of the chamber and is then emitted on to the fire through three small horizontal openings. Thus we have a constant current of highly heated air at all times and on every side of the fire, mixing with it and purifying it. The fire-bars are hollowed on the top part of their surface, which necessarily holds the burnt dust, and acts as a non-conductor, causing them to last a longer time than ordinary shaped ones. Another advantage in the improved 'Treasure' Range is that the boiler is an independent portion of the whole, and not a fixture as in most ranges. A chamber is formed to hold it, into which it is placed. The side nearest the fire has parallel openings, and a space all around it to allow the heat to encompass it. The chamber around the oven has a series of gills, over which the heat has to pass; and the bottom has a loose plate, which taken up, discovers another row of gills on the under portion. It will be seen from this description that the same idea pervades the whole construction, viz., that of retaining the heat over the surfaces it has to travel as long as possible, which has the further advantage of reducing the cost of fuel. One other feature we desire to point out that nearly the whole of the interior fittings are loose, that is to say they are not fixed or secured, but each one drops into the place assigned for it, which, in the case of breakages or wearing out, enables new portions to be replaced without expense, and has the further advantage of enabling all the passages to be thoroughly cleaned from time to time without difficulty, and only one flue is necessary for the whole. Mr. Constantine has evidently most carefully studied every detail calculated to improve his apparatus, and to render it as perfect from a sanitary point of view as human ingenuity could suggest, and he who attempts to introduce a new kitchen-range to surpass the 'Treasure', will find, to use a familiar expression, that he has a 'hard nut to crack'.

Messrs. RITCHIE & Co., St. Swithin's Lane, whose 'Lux-Calor' Hygienic, Condensing, Heating, Lighting, and Ventilating Gas Stove has been a subject of much interest during the past year, and which has been described on a previous occasion in the SANITARY RECORD, are present with this interesting apparatus. The stove is certainly of

For Heating.

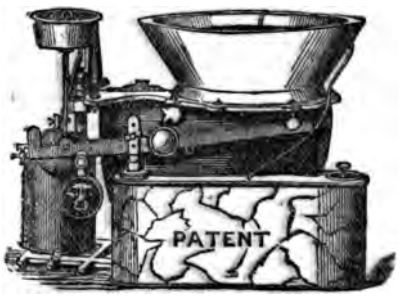
For Heating and Lighting.

novel construction, more especially so as combining lighting with the other necessary attributes of a heating appliance, and as all the products of combustion are condensed and discharged in the form of a liquid, containing the sul-

phur and poisonous gases, the burning of coal gas is rendered in this apparatus a perfectly safe proceeding. Where gas is not obtainable, mineral oils can be used instead, and there are numerous uses for which such an appliance may be found of inestimable advantage.

Messrs. SHANKS & SON, Tubal Foundry, Barr Head, near Glasgow, exhibit their Patent Bath Fittings and Bath—by their improved arrangement, hot, cold, and discharge taps are arranged in one piece—which is admirably adapted for ship use, or rooms where space is limited; several lavatories of the most approved construction, and handsomely mounted, with others of a less expensive character for schools, offices, etc; their patent 'Crown' wash-out closet and trap; and valve closet working from the main, with supply valve and improved brass air regulator for after-flush; several water-waste preventers, and their patent 'Safety' slop sink, embodying several improvements which enhance its sanitary value.

The ANTISEPTIC APPARATUS MANUFACTURING COMPANY exhibit their patent appliance for the purpose of preventing sewer or any other foul gas from entering the house. The apparatus, which is now generally known, is self-acting,



fixed out of sight in a few minutes, cannot well get out of order, lasts many years, and secures perfect safety from noxious vapours in closets, pipes, drains, and sewers.

Messrs. C. KITE & Co., 117, Chalton Street, N.W., who were among the earliest inventors of the modern description of ventilating and other cowls, are represented by their Registered Improved Dormer Ventilator, specially applicable to roofs of churches, halls, public buildings generally, villas, shop fronts, etc., and which can be easily fixed to the building without any detrimental effect to its appearance; a consideration which will at once recommend it to architects. It can also be made to fit on the ridges of roofs. The patent Albert Chimney Caps are also exhibited. These caps have been before the public for many years, and the numerous testimonials received by the inventors of the effectual prevention of down-draught by their use, stamp them as amongst the most efficient in the market, their moderate price being also much in their favour. Messrs. Kite & Co.'s most important exhibit is probably their Registered Drain Ventilators, which by a system of siphonage perform the operation of ventilating, and so purifying the soil pipes and preventing the entrance of sewer gas into a house, howsoever defective the closet arrangements may be. One is an Air-exhaust Ventilator for drawing out sewer gas from soil pipes, drains, with no movable parts: therefore cannot get out of order; and the other an inlet ventilator for driving down fresh air into the drains, ships, mines, etc. They are, of course, connected by pipes, carried down from each to the drain pipe, the one being intended to be fixed at one end of a building and the other on the opposite one. It will be seen that the inlet ventilator is so formed as to drive down a constant current of fresh air into the drains, which being driven along them is, so to speak, siphoned out by means of the exhaust ventilator at the other end. They are constructed on scientific principles, and appear calculated to effect the required purpose. The exhaust ventilator should be fixed the higher of the two, in order that in still or foggy weather the warm air in the drains may ascend the lower shaft and the cold air descend the shorter one, thus keeping up a continuous current of fresh air through the drains at all times of the year. They are simple in construction, neat in appearance, have no movable parts, and their moderate price renders them probably the cheapest apparatus of the kind in the market.

Messrs. ROBERT BOYLE & SON, ventilating and sanitary engineers, Glasgow and London, display a variety of their celebrated Self-Acting Air-Pump Ventilators, the merits of which are too well known to require any special description from us. They are found in use to create a continuous and powerful up-current, and to be entirely free from down-draught. Being fixtures they can never get out of order or make a noise—most important points. They are here shown constructed to suit different styles of architecture, from the most ornamental and elaborate to the plainest form. The highest testimony has been given in their favour from such men as the late Sir Gilbert Scott, Sir William Thomson, the electrician, and other eminent authorities. Messrs. Boyle also show modifications of their air-pump ventilators, intended for the ventilation of soil-pipes, drains, and sewers, in effecting which they have been eminently successful. A large plan, likewise shown by this firm, demonstrates how their complete system of ventilation is applied to a dwelling house, provision being made for the effecture of the extraction of the vitiated air, and the heat and products of combustion arising from the gas, and for the admission of a supply of fresh air, hot or cold as required, without draughts or currents. The plan seems to be the essence of simplicity, and we understand that experience has proved it to be very successful in practice. A model and plans are also shown of Messrs. Boyle's improved system of Ventilating Steam Ships and Public Works by means of the boiler furnaces, which is well deserving of attention. There is also here to be found an effectual cure for Smoky Chimneys, the action of which is shown in a very surprising manner by means of a working model.

Mr. ERNEST TURNER of 246, Regent Street, W., exhibits a sheet of plans showing his method of draining various types of town houses. Amongst others we notice the plan of the Home Hospital, Fitzroy Square. The simple and economical system adopted at this institution was favourably reported upon by the medical and sanitary journals at the time the hospital was opened, and a year's working has proved it to be eminently satisfactory.—Description of the London and Provincial Steam Laundry, which is fully described in the SANITARY RECORD of October 15, 1880.—Plan of Fever Hospital, Newton Road, Devon, about to be erected under the designs of and under the superintendence of Mr. Ernest Turner, F.R.I.B.A., 246, Regent Street, W., for the Torquay Local Board, a short distance from Torquay. The object of the Board is to obtain a complete building of moderate size, perfect in its sanitary arrangements, at the lowest cost possible, which may serve as a model for similar buildings throughout the country. The idea is not to erect a large hospital for the curative treatment of such diseases as scarlatina, small-pox, typhus, and cholera, but the isolation of the first few cases which appear, in order to prevent the disease from becoming epidemic. Accommodation is provided for the treatment of twenty patients in eight wards, four wards containing four beds each, and four single-bedded wards. The drainage does not pass into the town sewers. Earth closets are used throughout; these have receptacles which are removed from the outside of the building. The slop-water from sinks, baths, etc., is collected in Field's flush-tanks, from which it is discharged rapidly through glazed drains to a system of pipes laid with open joints to allow it to soak into the ground. Rain-water is collected for use in the laundry, etc. The wards are heated by means of open ventilating stoves. The laundry, which is in rear of main buildings, comprises washhouse, ironing-room, and disinfecting chamber. A mortuary, ambulance shed, etc., are also provided.

A model of an important sanitary invention, that should commend itself to the various Boards of Health and all sanitary authorities throughout the kingdom was shewn by Mr. J. R. PICKARD, of Leeds, the inventor and patentee. It is named the 'Gormand' Furnace, and is designed to burn the feculent matter and other material which too often spread disease and death in our large manufacturing towns

and crowded cities. As we shall probably on a future occasion revert to this invention, by means of illustrations, in a more exhaustive manner, we shall now merely remark, that it is so built that carts bringing refuse can at once discharge it into the opening or orifice of the furnace; that the longest lying matter is at the bottom of the furnace, and between or nearest the fires, the heated gases from which can only escape by the flues which are in the crown of the apparatus; that the latter are self-cleansing, and thus maintain an unvarying area for the escape of the gases; and that additional or purifying fires are provided, over which all the noxious gases pass before entering the chimney. Another excellent sanitary invention of Mr. Pickard's is his Patent Deodorising Closet and Ash-pit Refuse Separator, which prevents the rubbish and other foreign matter that find their way into the ash-pit and cesspool from being mixed with the excreta, which gives greater value to the manure without inconveniencing the farmer when distributing it upon the land. His Smoke-Consuming Apparatus for furnaces appears to be an admirable arrangement, and very simple in construction, and is one in which we and the readers of this journal generally are deeply interested, the more particularly that it bears directly upon the question on which we are now actively engaged, viz., the approaching Exhibition for the Abatement of Smoke. Yet another invention no less important than the preceding was on the stand of Mr. Pickard. This was an Open Fire Smokeless Grate, the main feature in which was the presence of a combustion chamber at the back of the fire basket, into which all the smoke is driven by means of wide openings in the basket, when it becomes burnt ere it enters the chimney. Taken as a whole, Mr. Pickard's exhibits were some of the most important in the building.

Mr. G. E. PRITCHETT, F.S.A., 20, Spring Gardens, London, who takes a first-class award, had several examples of his ingenious system of heating by hot water, either through the agency of coal, gas, or mineral oil. He employs sheets of corrugated iron of various sizes, according to requirements, made up into a chamber about one-eighth of an inch thick, and in this small interstice water is made to flow on the usual principle. The great advantage gained is the small quantity of water required for a large heating surface; for instance, about three pints of water spread over the area of one of the sheet chambers will throw off as great an amount of heat as, say, ten or twelve gallons used under the circulating pipe system. It is also far cheaper in first cost, and can be generally adopted at a less expense in all its working arrangements. One of his most effective applications of this mode, is by providing a dado composed of ornamental louvres, with the corrugated chambers behind. The heat from the chambers permeates into the apartment through the louvres, and the degree of warmth can be easily regulated.

THE UNIVERSAL VENTILATING, SANITARY, AND ENGINEERING CO., LIMITED, Lewisham Bridge, London, S.E., had several specimens of their 'Stevens' Exhaust Ventilators and Chimney Tops, and the Drawer Inlet Ventilator, by the same inventor. The former are of the 'fixed' character, and on a principle adopted by other firms making a similar class of article, viz., to construct the apparatus of such a form that from whatever quarter the wind may blow, a partial vacuum is created, which secures a constant powerful up-current, though the shape of their top is different to any other, and more simple than many. The Inlet Ventilator is doubtless one of the very best with which we are acquainted. The air enters from the outside through a perforated brick, is then cleansed by a woollen frame (which can be removed from time to time), then, guided by curved partitions, is made to take a vertical current towards the ceiling, gently warming as it ascends, and being gradually dispersed no draught is felt. The front of the drawer or inlet in the room may be made of the most ornamental character or otherwise, and according to the distance it is drawn in or out, so is the amount of fresh air regulated. One of the advantages of this apparatus is its simplicity and non-liability to get out of order.

A collection of Window Blinds, of excellent make and finish, was sent by Messrs. HENRY TYLOR AND SON, East Road, City Road, an old-established London firm of considerable note in this trade. Amongst the Venetians we noticed one with an improved patent action in the head, of simple construction, and which secures the blind in any position it is drawn to without hooks or fastenings. Several examples of well-made ornamental Brass Bedsteads, of which the firm are also makers, were also shown, as well as some exceeding good shapes in Wooden Coal Boxes, a recent addition to their manufactures.

Messrs. CROSSLEY BROTHERS, of Manchester, exhibit their popular 'Otto' Silent Gas Engine, which appears to work as well with portable mineral oil gas as it does with coal gas.

Amongst the other Ventilators shown, were those of Mr. J. E. ELLISON, of Leeds, who receives an award of merit, and whose invention has been fully described in our columns; and of Mr. P. HINCKES BIRD, F.R.C.S., who takes a similar award.

Messrs. GILMORE AND CLARKE, Lower Norwood, Surrey, showed their system of ventilation, both by induced current air bricks, chimney tops and caps, and automatic temperature ventilators. One of the great recommendations of Messrs. Gilmore and Clarke's Ventilators is their extreme lowness in price, being probably cheaper than anything else in the market. This firm also takes an award of merit.

Weare's Patent Air-Tight Inodorous Commodes in various forms were shewn by Mr. GUY WOOD, Gore Street, Piccadilly, Manchester. The ingredient used for these closets is a specially prepared inodorous compound of animal, vegetable, and mineral charcoal, and its powerful antiputrescent and absorbent properties render it most efficient for the purpose. It is claimed for this preparation that a closet manufactured with it may be used in a bed-room without the slightest smell being detected, and for this purpose closets are made of such a form that their detection as a commode is scarcely possible. They are also made up in a very cheap and portable form for emigrants' use and as an inodorous slop-pail.

Mr. WILLIAM HELLIER, of Duke Street, Grosvenor Square, whose Instantaneous Water Heater was recently described in the SANITARY RECORD, exhibits specimens of the apparatus, both as independent heaters, and in connection with coils for the warming of apartments, conservatories, etc. In addition to these, he shows a new application of his principle, which we illustrate, called a 'Cabinet' Water Heater, designed to attain absolute security from the danger of boiler explosions, and to maintain a constant supply of hot water without the assistance of a kitchen boiler. This consists of an instantaneous water heater and a wrought iron galvanised cistern, which together form a most complete apparatus for the production and storing of wholesome hot water in any quantity for all the purposes for which it may be required. The water in the cistern can be heated in a comparatively short space of time; but should hot water be required, it may be had at any moment, without heating the water in the cistern, by pressing down the rod, which closes the valve, and prevents the hot water from the heater flowing into the cistern, which may be drawn off at the tap in the same way as when the water is heated in the cistern; or it may be superheated to any temperature up to boiling, the water in the cistern returning to be heated through the pipe. When the cistern is enclosed in a wood casing, as shown, and packed with a good non-conductor, the water will retain its heat for a considerable time, by which a great saving of gas is obtained. Another means of economising the gas, by utilising as near as possible the whole of the heat generated (which has been the principal aim of the inventor of these heaters), is the introduction of a copper flue from the top of the heater through the water in the cistern, through which the residue of heat from the heater passes, and is absorbed by the water which surrounds it.

Mr. OWEN, of the West Croydon Sanitary Works, exhibits a very good assortment of ventilating and other sanitary appliances, consisting of single and double trapped water closets, horizontal, vertical, and over-head water supplies, sewer traps, gulleys, urinals, etc., so arranged that all noxious gases are prevented from entering the

house. His patent plug-action supply valves for cisterns, baths, etc., and the same appliance adapted to a two-gallon 'Waste Not' supply cistern were well worth notice. All Mr. Owen's closets are ingeniously constructed.

The Birmingham Sanitary Association, Colmore Row, Birmingham, exhibit a number of useful appliances, prominent amongst which is Pott's patent Edinburgh air-chambered sewer trap, which has attained considerable reputation in the sanitary world. Several Medical Officers of Health speak highly of its merits. Its construction appears to have been carefully considered, every possible danger in connection with the admission of sewer gas in the house has been guarded against, and this trap combines efficient trapping with thorough ventilation of the sewer.

Mr. A. SHAW, of Lewes, Sussex, showed an ingenious Mechanical Dry Closet, which is perfectly self contained. It is opened and shut by means of a handle and worm, working into a wheel giving motion to two segments placed within the chamber, which discharges the excreta without the aid of water for flushing. The soil pipe cannot be left open to the atmosphere. If the closet is open or shut, a segment will be closed, which shuts off all communication with the soil pipe. No noxious gases can pass through it to the atmosphere, consequently the air is free from all danger of being contaminated with sewer gases. It appeared to be well made, the internal working parts being of brass. It was certainly the greatest novelty as a closet in the exhibition; we defer passing any opinion as to its working capabilities until we have seen it in use, but are favourably impressed with its working arrangements.

Messrs. LONGDEN and Co., Sheffield, exhibit the Leeds Patent Radiating and Ventilating Stove, of cylindrical form and calculated to diffuse its warmth to the farthest point of any apartment in which it may be placed. The inventors claim that in this respect it is in advance of any stove yet made. A peculiar feature in the Leeds' stove is, that it admits its heat more from the bottom than the top, thus warming the lower part of the apartment first. An open fire slow combustion-grate is also exhibited by this firm, the back, sides, and bottom, with the exception of two short bars towards the front, being composed entirely of fire clay, the lower part of the back forming a curve or sweep towards the front bars, materially lessening the size of the fire basket, and as the makers claim, thus securing an excellent shape for combustion and draught. Another feature in this grate is, that a division is formed in the fire-brick back, just above the fire line, in which are several small holes admitting air over the fire, thus tending to facilitate combustion and reduce smoke.

Messrs. HAYWARD, TYLER and Co., Upper Whitecross Street, exhibit a number of fittings of excellent workmanship connected with sanitary engineering and protection against fire, and some specially well-made deep well and other pumps. The objects appearing of greatest importance are the closets offered, to take the place of the now generally condemned 'Pan Closet'. There were some excellent valve closets, scarcely inferior in appearance to the most expensive class, and practically equal to them in working power; which by system and economy in the manufacture, this firm are able to offer at very reasonable prices, so that a valve closet may now be used in many places where it was formerly out of the question on the score of cost. A more novel form still, and one which attracted more attention is their 'Full-flush Valveless Closet.'—a closet of the Hopper style, which the firm sell in combination with an excellent arrangement of flushing cistern and water locking valve, thus securing a full flush, while complying with all the requirements of the water companies. The makers find that a good closet is often made useless through being fixed with a bad flushing cistern. By selling the whole apparatus complete, they ensure the whole being in proper working order, and the closet is made to be fitted into the place of existing pan closets without alteration of the seat. The whole arrangement is simple, workmanlike and easily understood. Hydrants, standposts, and water pillars, pumps, etc., not omitting bath fittings, are included in Messrs. Hayward, Tyler and Co.'s exhibits, being all London made and of the most improved construction.

Messrs. BULLIVANT, TAGLIAFERRO AND CO., Ledbury Road, W., and Dulverton, Somerset, exhibit their Patent Air-tight and Noiseless Sliding Sash Windows, which obtained a medal at the Philadelphia exhibition in 1876, and again at Paris in 1878. This patent is designed to obviate all accidents arising from the cleaning of windows; for the exclusion of air, dust, and moisture when the sashes are closed, and to prevent rattle or shaking by wind when closed or open. The sashes are easily removed from the inside for cleansing or other purposes, and as there is absolutely no friction on the pulley-stile they can be polished or painted. The pullies and sash lines are almost concealed, which gives a much improved appearance to the window. The mechanism and arrangement are very simple, and they are extremely moderate in price.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE SANITARY STATE OF VENTNOR.

The attention of the Ventnor Local Board has been directed to articles which have appeared in various medical and other journals, commenting upon the report of Dr. Ballard with reference to the sanitary condition of the Isle of Wight; and as twelve months occurred between the inspection and the issuing of the report, the Board desire me to forward to you for publication the following extracts from a report which they received from their Sanitary Committee in March last, in order to remove any impression in the minds of the public that the evils complained of by Dr. Ballard have remained unchanged to the present time.

'The main water-supply of Ventnor is a typically pure and wholesome water, and the quantity is superabundant. The Committee cordially endorse the extreme precautions taken by the Board against the most remote risk of contamination of the water by directing the overflow of the reservoir in an open stream down Grove Road. In cases where houses do not draw from the main supply, but have private sources, nearly the whole of these sources have been examined into chemically by Mr. Hehner, the Public Analyst for the Island, and where his reports have been unfavourable, the Committee have recommended the Board to order the closing of the wells. The few private sources still unreported upon are also to be shortly examined by Mr. Hehner.

'The attention of the Committee has been carefully directed to the slaughter houses in the town, and many necessary arrangements have been made.

'The sewerage arrangements of the town have received attention, and the number of ventilators on the main drains is now sufficient to save the traps of the house-drains from any undue pressure of sewage gas.'

C. H. WILSON, Clerk to the Board.

At Edgware, C. B. Walker, builder, of Willesden, has been summoned for infringing the bye-laws of the Local Board. The complaint was that there was no concrete foundation to some houses defendant had built, and that the bricks were unsound. Defendant was fined in the aggregate £10. He was further charged with threatening Mr. Rotson, the surveyor to the Willesden Local Board, and fined £1 and 8s. costs, besides being bound over to keep the peace in two sureties of £25 each.

Prof. G. C. Caldwell, MM. C. Jenssen, Friedländer, Schrodt, and Schmöger, state in *Biedermann's Centralblatt für Agrikultur Chemie*, Vol. IX, No. 10, that the results obtained by the use of the lacto-butyrometer in testing milk sometimes agree with and sometimes differ from those given by direct analysis.

NOTES ON EPIDEMICS.

ɔropose to give from time to time, under this heading, such we can glean from reports of health officers and from other as to the etiology and spread of infectious diseases as observed investigators. It is highly important to codify these local ices, but the task has never yet been attempted. We would to express a hope that this column may eventually be found derable assistance in this regard, and we earnestly invite all officers of health to favour us with their experiences. We ɔreover, be glad to give space, under this heading to d scuss the causation of epidemics, especially of those diseases the which is still obscure.—ED.]

NOTE ON SUMMER DIARRHŒA.

ding a report of the further discussion of this t at York, a remark or two on Dr. Longstaff's in the SANITARY RECORD of February last be desirable.

Longstaff seems to conclude from my remarks factor of birth-rate that a high birth-rate im- high diarrhœa death-rate, which is nonsense. ·ate, if unattended by certain social and meteo- al circumstances, is of no avail in the causation rhœa. But it is none the less true that there be an excess of infantile diarrhœa mortality t an excess of infants, the latter being *the* in this question. There is no reason, for ex- why Leicester, with a birth-rate of 38.4 in the ·o quarters of 1880, against a birth-rate of 38.0 tingham, during the same period, should have ·hœa mortality 50 per cent. above the latter vere the social and meteorological conditions ı towns not very different. There could be no · contrast; but Dr. Longstaff, sitting in London, ent to theorise about towns of which he knows ·ely nothing, except by hearsay, and about a , of which he says he has no great 'clinical ıtance'. This is to do what he pronounces sable in others; viz., to adopt conclusions t sufficient data.

remarkable that the table of birth-rates and ea death-rates, advanced to refute certain ents of mine, does the very opposite; Dr. aff's 'unhealthy towns' showing an average ate of 4.6 above his list of 'healthy towns', the ea proportion being almost the same, at 4·9; t of 'medium towns' occupying a medium n, both with respect to birth-rate and diarrhœa ity. Such logic as this will never disabuse my

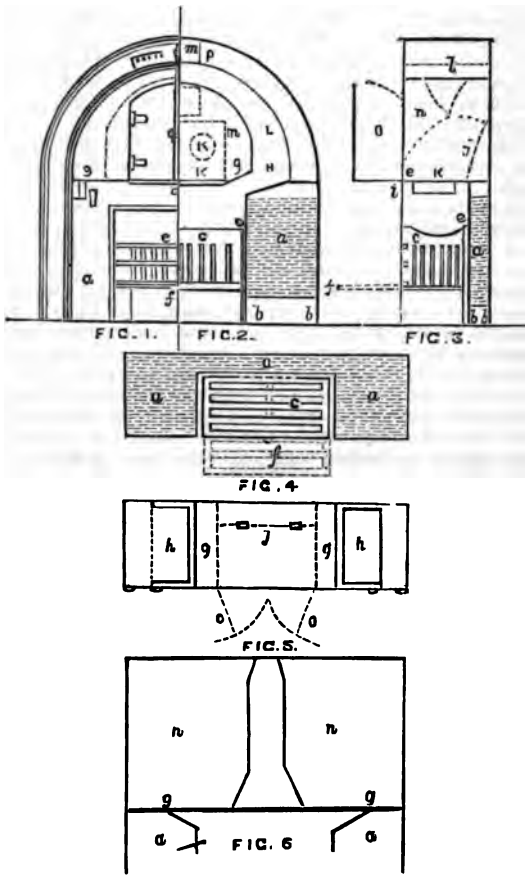
Nor is Dr. Longstaff more happy when he s about an *atrophic state of system* being 'part of the cause of *death*, and not of the '. I always understood that the late Registrar ıl attached more importance to the *primary*, e *secondary* cause of death, and that he framed nk certificate book accordingly. The 'cause h' *is* the *disease*, and if an *atrophic state of* plays a major part in the causation of summer ea, as it has invariably done at Leicester, then as I have always held, that the bare symptom ation, no matter how serious, plays a *secondary* ɔordinate rôle in the causes of death, and, as s to be taken and judged on its merits, and ; more. Medical Officers of Health are at waking up to this view of the question, and have done so long ago but for a false and mis- classification, backed up by the thunders of ıall.

ALEXANDER MCCOOK WEIR.

ırs. Hayward, Tyler, and Company have re- the first order of merit for their exhibit of d Water Machinery, and a second order of merit ɔecial part of their exhibit.

ILLUSTRATED SANITARY PATENTS.

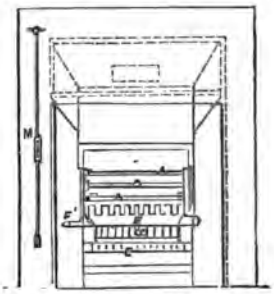
4435. (1880.) STOVES: C. M. WESTMACOTT, WESTMINSTER. [8d.]—This invention relates to an improved construction of stove by which the heat generated by the combustion of the fuel is utilised to a much greater extent than in any heretofore in use, while at the same time a great economy is effected by the more perfect combustion, so that the greater part of the smoke is consumed, and the down draught to a great extent being prevented, a smoky chimney is avoided. One form of stove constructed according to this invention, and by which its leading features will be clearly illustrated, is shown in Figures 1 to 5, Sheet No. 1; Figure 1 being a front elevation; Figure 2 being a sectional elevation; Figure 3, a transverse section; Figure 4, a plan of the lower part of stove, and Figure 5, a plan at the line A, A, Figure 1. It will be seen that in the recess usually occupied by the ordinary house stove or register or kitchen range he places upon the hearth or floor an iron hollow chamber A supported on suitable flanges or legs B, and the chamber A is of such form as to extend



to a certain height along the back and the sides of the said recess, and to leave a space open in the front; in this space he places a grate C of a shape corresponding to the space thus left, and this grate has bars, both at its front, bottom, back, and sides, and the grate is of such a size relatively to the said space as to leave air spaces D (Figures 2 and 3) between its back and sides and the hollow chamber A, and the top bars of the grate do not reach to the height of the top of the hollow chamber A. This grate is provided at its top or upper part on three of its sides, that is to say, at its back and right and left sides, with a flange E, as shown in Figures 2 and 3, which flange will ensure the passage of the air through the apertures between the bars. The spaces

D are by preference made of a greater width than the apertures between the bars to prevent any clogging or choking of the spaces D. All the bars herein-above spoken of are fixed bars. Beneath the bars at the bottom of the grate is placed another and moveable set of bars F, of such a corresponding form or shape that when actuated by a lever or other arrangement, the bars can be made to close, or partially to close, the apertures left between the bottom fixed bars, so that the rate of combustion may be thereby regulated and the stove used, as may be required, either for quick or slow combustion. As shown in the drawings the bars at front of grate are horizontal bars, but he, in many cases, prefers to make such front bars vertical, but, in any case, he makes the openings between such bars, whether horizontal or vertical, of very small dimensions, that is to say, with very narrow spaces between them ; and this applies in a great measure to all spaces between the bars of the grates in these stoves, whether front, back, bottom, or side ; and he in some cases makes round or other shaped apertures instead of longitudinal or vertical slots or spaces for the admission of the air to the fuel He places upon the hollow chamber a plate of iron G in such a manner as to cover the space over and above the grate. This plate has holes or openings H at its ends where it approaches the sides of the hollow chamber A. These openings are for the purpose of admitting the smoke from the fire, the plate diverting it from ascending in the usual manner. When this stove is used for cooking purposes, the central part of this plate (that part directly over the fire) is provided with a lid J hinged to its back part. This lid has circular openings K to receive saucepans, kettles, or stewpans, and these openings are provided with covers. When not in use for cooking and a more open fire is required, the lid can be thrown back on its hinges. He also constructs the upper part of the stove with two curved flues, one flue arising from the opening at right hand side of the plate, and the other arising from the opening at left hand side of the plate. He contracts the openings of these flues towards their upper part, and he there provides a damper. The form of these flues leaves a semicircular recess over the plate hereinbefore mentioned as above the grate. He encloses this semicircular space or recess at the back, and at the front he places a slide or door. The space thus enclosed forms an oven, and when the front slide or door is opened the space can be utilised for boiling purposes. The stove is obviously always available for roasting purposes, the form of the grate being well adapted for that purpose. The damper can be used when it is necessary to clean the chimney and to admit the smoke vertically when the hinged lid in plate is thrown back. He provides this plate beneath at front with a vertical depending flange in order to guide the smoke into the curved flues. When used for cooking purposes, and at other times if desired, the hollow chamber can be utilised as a boiler, the current of air between it and the grate preventing any possibility of the hollow chamber overheating and cracking. Coal, coke, peat, wood, or other fuel, can be used in the grate, and it can be arranged also to burn gas. This stove may be so adapted as to be used as what is known as a sanitary stove, or stove to supply pure warm air to one or more rooms.

4448. (1880.) FIREGRATES : E. R. HOLLANDS, LONDON. [8d.]—This invention has for its object improvements in fire grates. In order to obtain a more perfect combustion of fuel in domestic fire grates, he supplies the fresh fuel beneath the already fully ignited fuel in the fire basket. For this purpose he provides the fire basket with a moveable bottom, which, when the fire is to be fed, falls away from the upper part of the fire basket, and at the same time advances into a convenient position for the charge of fresh fuel to be put into it. Before, however, the moveable bottom of the fire grate makes the movement described above, a rake-like set of bars enters from the back horizontally, or nearly so, between the bars of which the moveable bottom of the fire basket is in part composed. These rake-like bars also, when they have thus passed in underneath the fuel in the fire basket, rise and lift the fuel clear of the moveable bottom ; they then remaining stationary whilst the moveable bottom makes its forward movement, they support the fuel in the fire basket during this time, and do not retire until the moveable bottom has been returned to its place. In order conveniently to impart the requisite movements to the parts described above, the following arrangements are made : The moveable bottom is supported underneath, after the fashion of a parallel ruler, by two pair of parallel but inclined links jointed to it and passing to the rear, where, at their lower ends they are also jointed to the stationary frame. A connecting rod couples one of these links with a lever situate at one side of



the grate and in rear of the fire basket. This lever has its movement in a vertical plane about a fulcrum at its lower end, and when the upper end is drawn to the front, the moveable bottom of the fire grate makes its forward descending movement. To the upper end of this lever there is jointed a second lever, which serves to give motion to the rake-like bars, as hereinafter described. This second lever is a hand lever, and by raising the handle the rake-like bars are brought into position to support the fuel in the fire grate. When the handle has reached its highest position it can be drawn forward, and so motion is given to the back lever, and to the moveable bottom of the fire basket. This forward movement cannot commence before the handle has been fully raised, there being a stop upon the hand lever and a shoulder upon the frame, which prevents any forward movement until the stop can pass over the shoulder. For the purpose of carrying the rake-like bars, two arms are provided, one on either side of the fire basket, and extending to the rear. These arms are jointed at their fore ends to the frame, so that their hinder ends can move up and down. From these arms the rake-like bars are suspended by a pair of hangers, each jointed at the top to the arm, and at the bottom receiving a pivot projecting from the end of the back bar or head of the rake-like instrument. This rake is also supported by a stationary horizontal guide bar, on which (except whilst the fire is being fed) the forward ends of the rake-like bars rest.

4365. (1880.) BATHS : W. T. SUGG, WESTMINSTER. [6d.] — This invention relates to that class of bath for domestic use in which the water to be used by the bather is heated by gas after admission to the bath, and it consists in a novel construction and arrangement of the bath, whereby a greater heating surface will be obtained than heretofore,

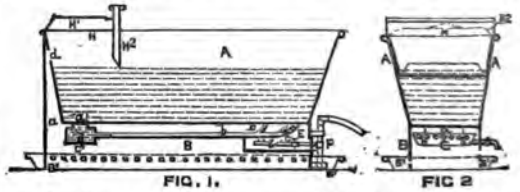
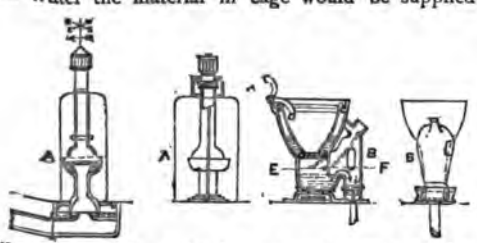


FIG. 1. FIG 2

and the disagreeable effects caused by the escape of the products of combustion of the gas into the room will be avoided. In the accompanying drawing, Fig. 1, is a longitudinal section of a bath constructed according to his invention. Fig. 2 is a cross section taken on the line 1, 2, of Fig. 1. A is the bath proper or receptacle for the water, and which is of the ordinary construction. The bath is mounted upon a case B of a form corresponding to the bottom of the bath A with vertical sides, and in which the heating apparatus is placed. Under the bottom of the

bath, and at the foot end thereof, is placed a semi-circular or other conveniently shaped well or chamber C. This well is connected with the foot end of the bath by a short neck A, and with the head of the bath by a series of small horizontal water tubes, B B. He thus obtains direct communication between the well and the head of the bath. Over the neck A, he places a removable perforated plate A^1, and covers the openings to the tubes B by a similar plate B^1. The gas burner D, which will be a swing burner of any approved construction, and fitted with steatite, fish tail, or bat-wing burners for heating the water, is placed in a combustion chamber E, situate under the head of the bath and within the case B. Air is admitted to the burner through holes in the sides of the case B and through holes in the bottom of the chamber E. In order to shut the burner into the combustion chamber a door F is provided. This door is connected with the burner, and swings in and out with it. The tap or cock C, for turning on gas, is placed just inside this door, so that the door must be opened and the burner swung out before it can be lighted, thus avoiding the fear of explosion which might arise if the burner were lighted without being drawn out of the chamber E. He prefers to stand the case B in a trough B^1, so that any water of condensation dropping from the heating surfaces may be conveniently collected. When it is desired to use the bath the required amount of water is placed therein, and the gas is lighted. The heat will first strike upon the forward ends of the tubes B, which immediately overlie the burner and heat the water therein, thus creating a circulation of the water, the heat will then gradually diffuse over the whole of the bottom of the bath. By this means he not only gets the whole surface area of the tubes, but the bottom of the bath and also the well, as the heat-absorbing surface, which enables him to heat the water with the greatest possible despatch. The products of combustion (which consist principally of carbonic acid with a trace of sulphur fume) are conducted by a flue or pipe G to an opening D in the foot end of the bath above the water level.

4370. (1881.) WATER CLOSETS, ETC.: J. W. HOLLAND, LONDON. [6d.]—Figures A^1, A^{11}, shew a vertical section and elevation of a urinal. The drawings shew the construction. When urinals are formed in this way it is advantageous to place at the top of the ventilating shaft of the urinal a chamber surmounted with an extracting cowl, the ventilating shaft being carried up some little distance into this chamber, upon the top of which is placed a cage made with as large meshes or holes as its purpose will allow, this cage to contain sponge, charcoal, or any other porous and suitable material upon which one or more small jets or sprays of water would play; the supply of water through the jets would be regulated by a ball valve, which would be opened and closed according to the height of water contained in chamber; when the jets are not supplied with water the material in cage would be supplied by



capillary attraction; in this way the water in chamber would be chiefly absorbed, the action of supply, etc., being automatic, the object of this arrangement being to better obtain an upward current, and so promote ventilation, and also to purify or practically to destroy the noxious gases rising in all cases from urinals, and poisoning the whole of the surrounding atmosphere, more especially when placed contiguous to houses, as in large towns, and the air that enters the upper parts of these buildings. It is not necessary that all these improvements shall be used together, they may be in part only adopted. He also forms a water closet of strong earthenware, cast iron, or other suitable material, with a closed chamber at the side communicating with the closet basin, which may be called an intercepting or disconnecting chamber, from which a ventilating pipe is led off to the open air; into this side chamber the trap of closet is made or arranged to discharge itself, but has no immediate or direct communication with the soil pipe which is connected to the bottom of the side chamber. He forms a combined basin, intercepting chamber, and trap, by making the outlet from the bottom of the basin to lead into, as it were, a trough, which passes across the chamber and forms the trap. A simple form of hopper and trap and chamber may be similarly formed. A ventilating pipe is carried from the top or side of the chamber, and the chamber is provided with an access door, and the junction for the soil pipe is placed at the bottom in the centre or upon either of the sides. A trap formed as above described, with hopper to discharge at end, or at either or both of the sides, may be used for lavatories, or made in one piece with them, and is applicable to the several forms of plug or tip-up basins, and also to urinals and sinks, or as gully and drain traps. In order to form the joint for connecting the down right soil branch to the soil pipe, he forms a groove externally round the branch or down pipe of closet, and upon which a round india-rubber ring is tightly fixed or jumped on. The lead soil pipe is dressed out to go over this, and is kept in position by a clip bolted together; this clip has a short neck and flange, so that, in addition, it forms a stand for the whole fixture, and may be independent in itself or form a part of another frame; this and the clip may be made of wrought or cast iron, or any other suitable material. The branch pipe of closet would have a flange made upon it with an hollow or groove on the under side close to the pipe, that is, on the inner side of flange, at such a distance from end as to take the bearing of the combined clip and stand in this groove. On the flange around pipe would be fixed a round rubber ring, the better to form a bed for bearing, and as an additional packing or seal, as a more effectual preventive against the passing of sewer gas at this joint or junction. The joint may be formed by itself, so that it may be applied to other forms of closet, or wherever sound joints may be required. It is not essential that a groove should be formed either in the branch pipe of closet, in the lead soil pipe, or in the clip; they may be perfectly plain, and a free movement allowed to the india-rubber ring or band, in which case the clip by preference may have a slight bead upon its surface and nearly at the top to act as a check or stop to the india-rubber ring. In order also that the basin of a closet may be kept perfectly clean, he forms the closet in such a manner than an inner basin may easily be put in or taken out for cleaning purposes; this inner basin rests upon a projecting rim formed on the inner side of the outer basin. The rim should have a continuous band of rubber, or three or four pieces of rubber or other soft material attached to and projecting from it, to prevent breakage when the inner basin is being dropped into position. The water service or distributor of water in basin will be moveable and distinct from inside of basin, being jointed where fixed to the projecting ears on outer side of basin, and from which it would take its bearings.

4504. (1880.) FIREPLACES, ETC.: A. JENNINGS, GLASGOW. [6d.]—This invention relates to certain improvements in the construction and arrangement of domestic fire places or grates, and in fittings connected therewith, specially designed to economise fuel, and to utilise a large proportion of the heat, which with the ordinary fireplaces or grates in use, is allowed to escape into the chimney. The improvements also comprise an efficient means of creating a strong draught through the fire, of consuming a maximum proportion of the smoke, and of preventing blow down or back draught from the chimney, while thorough heating and ventilation of the apartment is also secured. Under one improvement the bottom and back of the fireplace are made of one or more fire-bricks curved or inclined in semicircular form, to project outwards at the upper edge, and perforated, or cut when preferred, to form ribs or bars beneath. Ordinary ribs or bars are provided in front to retain the fuel which burns in the hollow of the fire-brick, and heats it to incandescence, not only immedi-

ately under and behind, but also all round to the top by the flame impinging on it, a large proportion of the heat of the flame being radiated outwards by the fire-brick. The products of combustion passing over the upper edge of the fire-brick, flow backwards into a short sheet-metal flue-pipe fitted inside the chimney, with its lower end kneed and opening to the fire gases, nearly on a level with and a short way behind the upper edge of the fire-brick. This flue pipe is fitted with a curved plate over its upper end, at a distance from it, sufficient to allow of the escape of the smoke, but curved downwards to deflect and prevent any blow down or back draught entering or affecting the draught of the flue, the force of the blow down being spent in the free space of the chimney surrounding the pipe. A damper is also provided inside this flue pipe, operated by a handle or knob passing out to the front of the grate. By a further improvement, the upper part of the grate immediately over and surrounding the fire-place is double cased or formed with a jacket either of thin cast iron or sheet metal, and the lower end of this casing communicates by a pipe

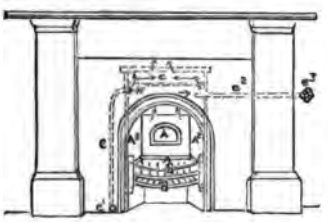


FIG. 1.

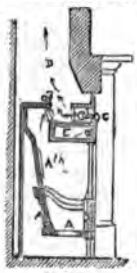
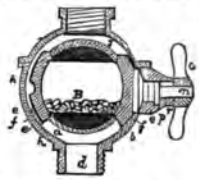


FIG. 2

with the air outside the apartment or building. A second pipe or tube leads from the upper part of the casing into the apartment, preferably through an ornamental grating at some height over the fire-place. By this arrangement the cold outer air enters the casing of the grate, is warmed therein by a radiant heat from the fire, and discharged into the apartment. A double casing is also provided under the fire-place, into which air enters from the apartment, is therein heated, and allowed to escape through perforations or a grating above into the back part of the fire, with the object of causing more complete combustion of the smoke. The hot vitiated air of the apartment is carried off near the roof by a small pipe or tube entering through the wall into the chimney, and carried up separately by this pipe to the top of the chimney, instead of being discharged into the chimney. In this way the air in the tube is heated by the smoke and waste fire gases in the chimney, and a good draught is obtained for ventilating the room. For the purpose of creating a good draught through the fire when desired, as in kindling, a revolving metallic shutter or screen is provided and fitted in the upper part of the grate vertically over the front ribs. This shutter or screen passes down when in use through a groove cut or left for it in casting the grate. This screen is preferably made self-closing by a spring, and is held down by friction or by ratchet stops when required. The vitiated air of the apartment may, when preferred, be led down from near the ceiling by a pipe passing inside the chimney, and carried down to the jacketed air space beneath the fire, whence the air is led into the fire to assist the combustion of the fuel and smoke.

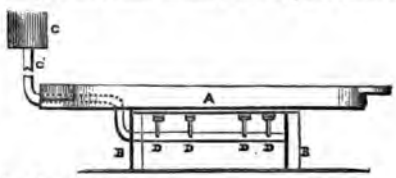
AMERICAN PATENTS.

236,307. FILTER: JAMES A. CROCKER, BOSTON, MASS., assignor to the Crocker Filter Company, same place. Filed Oct. 26, 1880. (No model.) Issued Jan. 4, 1881. —*Claim* 1. A filtering receptacle B, grooved or flattened on its outer surface for the passage of the water when not required to be filtered, and with a suitable device for rotating the same, in combination with an outer casing, A, having an inlet and outlet, substantially as described. 2. A support, *h*, with arms, *j*, in combination with a strainer, *g*, and a filtering receptacle, B, as and for the purpose set forth. 3. A circular wire spring, *i*, a support, *h*, and a strainer, *g*, in combination with a filtering receptacle, B, the strainer being held in place by said spring substantially as specified. 4. The stem *n*, with its projections *m* and



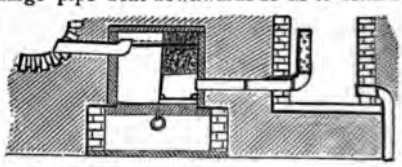
w, disk *u*, spring *v*, and handle C, in combination with a filtering receptacle having a channel, *l*, and an outer casing, A, having an opening for the reception of the stem, *n*, said opening being provided with a stop, *q*, and suitable shoulders for the stem to abut against, constructed to operate as and for the purpose explained.

237,672. GAS OR VAPOUR STOVE: JOHN BENBOW, CLEVELAND, OHIO. Filed July 9, 1880. (No model.) Issued Feb. 15, 1881.—*Claim* 1. An oil or vapour stove provided with a frame, A, burners D, a pipe, C^1, and reservoir C, the pipe, C^1, being supported by the frame, A, substantially as set forth. 2. An oil or vapour stove adapted



to rest in the fire-box of an ordinary cook stove, consisting of the frame, A, supports BB, fuel container C, and burners D, substantially as set forth. 3. An oil or vapour stove consisting of a frame adapted to be placed upon the top of an ordinary cook stove and supported over the fire-box, said frame provided with one or more stove-lid supporting flanges and having burners, fuel container, and fuel supply pipe permanently connected therewith, substantially as set forth.

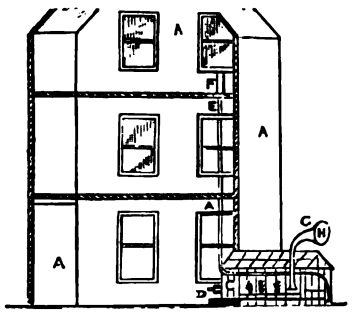
237,796. OVERFLOW APPARATUS FOR CESSPOOLS: GEO. W. ALEXANDER, BALTIMORE, MD., assignor of three-eighths to Clinton A. Wright and one-fourth to James A. Stewart, same place. Filed Dec. 9, 1880. (No model.) Issued Feb. 15, 1881.—*Brief.* A cesspool provided with an overflow pipe having a strainer, said pipe extending to a well having a removable cover and a basket to contain suitable deodorizing material, and extending from said well a discharge pipe bent downwards so as to form a trap.—



Claim 1. In combination with a cesspool, an overflow pipe, a well connected to the said cesspool by the said pipe, a body of deodorizing and disinfecting material located in the said well, and a discharge pipe leading from the said well to a sewer, substantially as herein specified. 2. In combination with a cesspool, an overflow pipe leading from the same, a well situated in such position as to receive the overflow water, a removable basket for charcoal or other like disinfecting and deodorizing material, and a discharge pipe leading from the said well to a sewer, having its inner end in the well turned downward to form a trap for gases, substantially as herein specified.

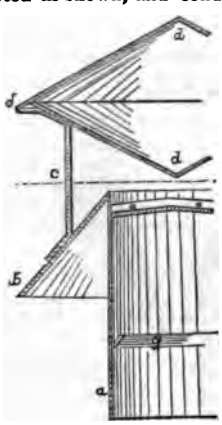
237,831. VENTILATING HOUSES: WILLIAM DEWART, FENELON FALLS, ONTARIO, CANADA. Filed July 16, 1880. (No model.) Issued Feb. 15, 1881.—*Claim* 1. In ventilating houses, the method of freeing the air of its impurities which consists in conducting the same from the

: into a conservatory, where it is purified by the plants, :hen reconducting it back into the house in its purified ition, substantially as described. 2. The combination a house, A, and an adjacent conservatory, of the inlet



: C, having pump D, the outlet pipe E, having pump F, outside air pipe, G, having bent and flared outer end, ıtantially as herein shown and described, whereby the ure air from the house is purified by the plants and oduced into the house purer than the ouside air, as set th.

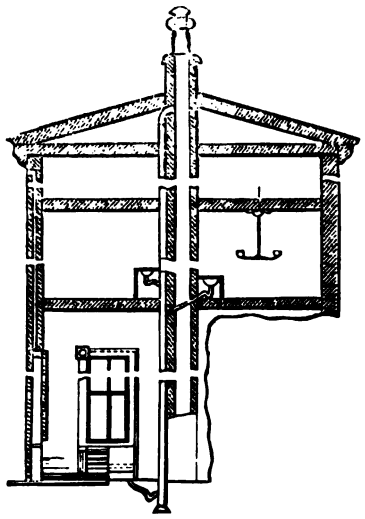
38,185. VENTILATOR FOR CHIMNEYS: EZEKIEL VAN ORDEN, BOSTON, MASS. Filed Dec. 27, 1880. (No del.). Issued Feb. 22, 1881.—*Claim* 1. The herein cribed ventilator, consisting of a flue *a*, gutter *g*, flange one *d*, supported as shown, and conductor *e*, provided



h the drip openings e^1 e^1, all arranged and constructed stantially as and for the purpose set forth. 2. The tilator described, consisting of the flue *a*, gutter *g*, ge *b*, conductor *e* e^1, and the cone *d*, provided with the) d^1, and supported as shown, substantially as and for the pose described.

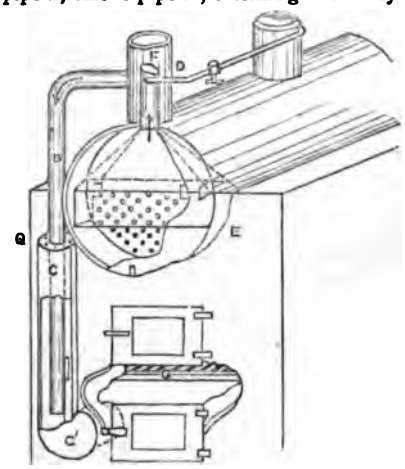
38,251. VENTILATING AND COOLING BUILDINGS: ISHA E. RICE, WASHINGTON, D. C. Filed Sept. 3, 0. (No model.) Issued March 1, 1881.—*Claim* 1. : combination of a building having a chimney, a sewer drain pipe below the same, and an upright pipe ex- led from the sewer upward within the building and oduced into the chimney at a point immediately beneath roof as contradistinguished from any other point.

38,256. SMOKE AND GAS CONSUMING FURNACE: L. D. SMITH, KEITHSBURG, ILL. Filed Sept, 30, 0. (No model.) Issued March 1, 1881.—*Claim* 1. : method herein described of consuming the waste gases urnaces, consisting, essentially, of first arresting the ke, sparks, and gases, then injecting a steam jet into n, causing a mixture of the same, then drawing in ospheric air through perforations, thus breaking its ume, then partially heating it before its admixture with mixture of steam and gases, then mixing the whole in eparate chamber, and forcing the combined mass into



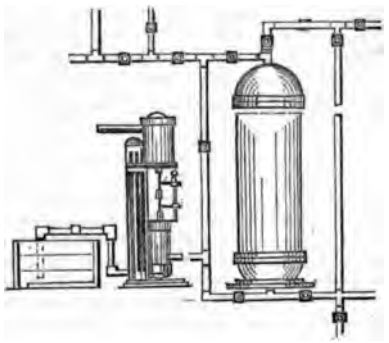
238,251 Ventilating and Cooling Buildings.

the combustion chamber, in the manner and for the purpose set forth. 2. The combination in a smoke burning and spark arresting furnace, of the smoke box E, hood B, steam pipe D, smoke pipe B^1, extending into air cylinder C,



as shown, said cylinder being provided with perforations Q, and mixing chamber C^1, opening into ash pit or furnace, all constructed and arranged in the manner shown and described.

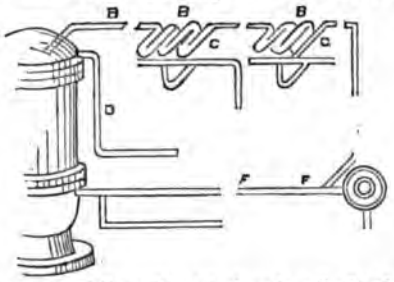
239,961. METHOD OF CLEANSING FILTERS: RALPH S. JENNINGS, BALTIMORE, MD. Filed June 1, 1880.



(No model.) Issued April 12, 1881.—*Claim.* The method of revivifying the packing of a filter without removing it

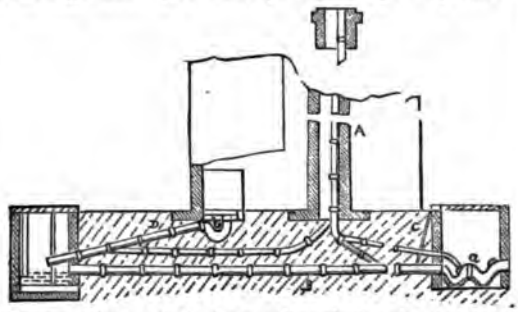
from the filter case, the same consisting, essentially, of cleansing the filter by passing an alkaline solution through the packing, then washing the same with currents of hot water, and finally drying the packing with hot air, substantially as set forth.

239,962. APPARATUS FOR RECARBONIZING CHARCOAL IN FILTERS: RALPH S. JENNINGS, BALTIMORE, MD. Filed Feb. 16, 1881. (Model.) Issued April 12, 1881.—*Brief.* Superheated steam is passed through the charcoal while in the filter in a direction contrary to that in which the liquid to be fitered was passed for revivifying the charcoal. Hot water is passed through the charcoal in the same manner, for cleansing it.—*Claim* 1. The com-



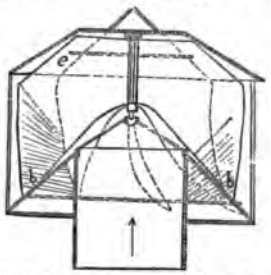
bination, substantially as hereinbefore described, of a filter containing charcoal, a steam degenerating device, a superheater, and connecting pipes, substantially as and for the purpose set forth. 2. The combination, with a filter containing charcoal, of a pipe, B, having a series of coils or serpentine bends, B^1, and heating devices, substantially as and for the purpose set forth. 3. The combination, with a filter containing charcoal, and provided with a supply pipe F, and discharge pipe D, of the pipe B, having a series of coils or serpentine bends, B^1, and the heating devices C^1, substantially as and for the purpose set forth.

239,940. MEANS FOR DISPOSING OF SEWER GAS IN BUILDINGS: WILLIAM M. DEE, CHICAGO, ILL. Filed Dec. 13, 1880. (No model.) Issued April 12, 1881.—



Claim 1. The conduit of ascending shaft A, located in the flue or chimney and leading from the sewer B through the flue or chimney to the top of the house or building, for producing a suction and creating a vacuum, substantially as and for the purposes specified. 2. The conduit or ascending shaft A, located in the flue or chimney, and branch pipe E, in combination with the sewer B and waste pipe D, for relieving the waste pipe and preventing the escape of the gas, substantially as specified. 3. The conduit or ascending shaft A, located in the flue or chimney, and relief pipe F, in combination with the sewer B, having the double trap *a*, for preventing the trap from becoming air-bound and producing a suction or vacuum in the sewer, substantially as and for the purposes specified. 4. The conduit or ascending shaft A, located in the flue or chimney, branch suction pipe E, and relief pipe F, in combination with the sewer B, having the double trap *a*, and waste pipe D, for producing and maintaining a vacuum and preventing the escape of gas into the house, substantially as specified.

240,245. VENTILATOR: CHRISTIAN A. FREDERICKS, BROOKLYN, N. Y. Filed Feb. 3, 1881. (Model). Issued April 19, 1881.—*Claim* 1. A ventilating fan, com within itself a wind wheel or motor and centrifugal e fan, the inner radial portions of the blades serving haust the air from the shaft and discharge it centrifi and the outer curved or deflected parts of the blades s to receive the force of the wind currents and act as a wheel for rotating the fan, substantially as set forth. combined exhaust and motor fan having blades consti as shown—namely, the inner portions plain and radia the axis to the margin of the ventilating shaft, wh they expose only their edges to the ascending curren the outer portions, beyond the shaft, made to extend



below the level of the top of the shaft, and that portic low the top of the shaft bent or curved to received the of the wind, substantially as and for the purpose set 3. The combination, with the ventilating shaft, c coned annulus around the outlet of the same, the r cap, and the fan having blades which extend radially the axis to the margin of the shaft outlet, and the po beyond the outlet arranged to drop below the mouth shaft and bent or curved to form a wind motor, sul tially as and for the purpose set forth. 4. In a venti the combination, with a ventilating shaft having a c annulus around its top and a cap or roof, of the fan h blades with their lower edges cut to an angle correspo to the angle of the annulus, and arranged to droop ov same, the lower exterior angles, B, of the blades bent or curved, as shown, and the inner part radia plain, substantially as and for the purpose set forth.

SANITARY INVENTIONS.

IMPROVED ROAD AND FOOTWAYS.

A 'Sanitary' pavement that shall be equally appli for roadways or foot-paths; and that may be used alik stables, manufactories, and in all places where a pave or sound covering to the ground may be required; that at the same time be a disinfectant, giving off an u vapour, so to speak, that shall destroy or render inno the exhalations emanating from the manure and matters, both liquid and solid, that are daily discharg our streets; and that shall effectually withstand the pr of air and water permeating through it; soft and elas the tread of animals, yet hard as adamant, and last, th not least, economical in price, would be a consumm that sanitarians may have dreamt of, but few have ima could be realised in fact. Without going so far as we have discovered such an invention, a small pie roadway, for which some such advantages are claimed recently been laid down in our midst; and several prov towns are, we understand, about to try the experi The paving of which we speak is of American inve and made by a Company calling themselves the ' national Pavement Company of the United States.' street in which this new roadway has been laid is a p of the narrow part of Queen Victoria Street, comme at the Mansion House Station, a part of the City in there is a large amount of traffic, both of the slow heav racter and the quick light description, and is about as a position for a test as could have been selected. pavement made its appearance in the States from

eight years since, and we understand that one of the ncipal streets in Philadelphia has been laid with it for ut seven years; we are also assured by Mr. King, one the directors of the Company, who has visited England for purpose of introducing it here, that, allowing for ordinary ar and tear, it is for all practical purposes as good to-day when first laid down. The materials of which it is com-sed are bitumen and limestone with a little mineral oil, d the mode of preparation is as follow:—The calcareous itter is crushed and heated, and in this state has a great inity for bitumen. The latter is also employed in a ated state, of a certain temperature, properly tempered, d in proportions that experiments have proved to be best r making the affinity complete. This is done by means of achinery, and the mass is run into blocks about 12 by 5 4 inches, weighing about 22 lbs. each. They are then bjected to a pressure of about 56 tons (that being the mit of compactibility of the material) and afterwards reated to a water-bath until cold and ready for use. In aying, a concrete bed is first formed; then a layer of sand bout one inch deep, on which the blocks are laid; and as e have observed, these are made in moulds, they lie very ose together, but the slight interstices between them are lled in with hot sand, and the operation is complete. When first invented, the blocks were made by hand, nd could not be sold at less than four shillings per lock; and pressure was not used to the extent it now is; nd it is with these hand-made blocks that the part of hiladelphia we have alluded to is laid. It was soon found, owever, that machinery would be necessary for their manu-acture, as the cost by hand was too great, and certain atures sought to be attained could hardly be accomplished.

Simple as it may appear to many of us to prepare ma-hinery for such a purpose as we have described, it was early four years before an apparatus satisfying the ideas f the inventors was brought to perfection, and these locks originally costing four shillings each in a compara-vely imperfect form, can now be supplied to bear the akers a good profit, at twelve shillings and sixpence per quare yard, a price that will, we presume, compete with e cheapest form of paving, independent of its many other dvantages.

It appears now to be generally accepted in the States as e best paving ever invented, and orders are being received a large extent for it, which has caused the company to pen manufactories for its make in about one dozen diffe-nt places in the Union. When first laid down the blocks ave a black appearance, but this soon disappears, and ey quickly assume the appearance of stone. It is com-aratively noiseless, offers a good foothold, and is springy r elastic to the tread of horses, and presents a regularity f surface for wheels. It is said to be impervious to mois-ure, and for that reason is admirably adapted for tunnels, undations, sewers, etc., while its resistance to heat or ld has been thoroughly established. It is strongly recom-ended on sanitary grounds from the presence of carbolic id in the compound, and its inability to decay. Other ints claimed are the non-effusion of mud from foundation ring to its tightly-fitting joints, and the ready removal of and snow, because they will not adhere to it. It can easily adapted for any places where a light paving is quired, as it can be made as light as quarries while re-ining to the full its other qualities. Although there is doubt that this paving is scientifically made, and that all counts from America respecting it are of the most trust-rthy character, we shall look with interest to the beha-our of the little pieces in the City, which will to a great ent seal the fate of its adoption amongst us. Mr. King es not desire us to import the blocks from America; he mits, that given the machinery, etc., we can make it as ll and cheaply, and perhaps less so than themselves, and main object is to interest English capitalists in it, that Company may be formed here, or Royalties be let to se willing to undertake its make, and he has appointed ssrs. Blyth and Co., 17, Gracechurch Street, the agents the company, for carrying out the necessary arrange-nts. We have adverted to the principal features in this vention, though much more may be said upon it; but an interview with Mr. King, or with the agents of the Company, may probably bring many other interesting facts to light.

THE GENERAL GAS HEATING AND LIGHTING APPARATUS COMPANY, LIMITED.

THIS Company has been formed to take over and extend the old-established business of Messrs. S. Leoni and Co., Gas Engineers and Manufacturers of Gas Apparatus for Lighting, Heating, and Cooking, St. Paul's Street, New North Road. The names of Dr. Alfred Carpenter and Mr. James Glaisher, who are upon the Directorate, should of themselves be sufficient to give confidence to intending shareholders; and the fact that Mr. Leoni himself retains an interest in the concern to the extent of £5,000 in paid-up shares for seven years, secures the services of that gentleman for that time at least. The extensive works connected with the gas cooking, in which Mr. Leoni has been engaged for many years, and which has engaged his entire attention, have become so extensive that he finds it is more than one person can satisfactorily attend to.

We hope that the formation of this company will tend to increase the use of gas, and more particularly its adaptation to cooking purposes. The prejudices against gas for cooking and heating purposes are, fortunately, daily giving way, and the fact that most of the largest hospitals, infirmaries, workhouses, etc., have, under the advice of the profession, substituted gas for coal, that some of the most eminent men connected with medicine use it for heating purposes, even in their bed-rooms, is a presumption that properly constructed gas apparatus are as healthful as coal fires. Its economy and cleanliness are beyond doubt, to say nothing about the absence of smoke, against which a determined crusade is now being made.

We have before adverted to Mr. Leoni's successes, and amongst others, named the immense number of persons for whom his apparatus daily provides in the establishment of Mr. Whiteley of Westbourne Grove. Although we were aware that an immense saving had been effected by its use, we have now the authority of Mr. Whiteley to state that when cooking for *only* 1,600 people, he effected a yearly saving of over £800. Recently Mr. Leoni has erected apparatus for that gentleman which, in conjunction with the original ones, are capable of supplying the daily wants of about 4,000 people; doubtless with increased proportional economy.

Several persons have been summoned under the Smoke Nuisance Act for using on their premises furnaces, for the purpose of trade or manufacture, not constructed so as to consume their own smoke. The following fines were inflicted:—Edwin Newman, confectioner, 10s., with £2 2s. 3d. costs; Peter Schweitzer, baker, 10s., with £1 11s. 9d. costs; Henry Brooks, pianoforte manufacturer, £5, with £1 8s. 6d. costs. Mr. Sandison, the Government inspector, prosecuted.

Several of the preserved streams in Derbyshire have been poisoned by means of chloride of lime. In one case, at Bradfield, a favourite stream was completely poisoned, and at Anston the trout were destroyed by the same means. The chloride of lime had been given by colliery proprietors to their miners for the purpose of disinfecting their houses during the hot weather. The Duke of Leeds, the lessee of the waters, intends to prosecute.

M. Raynaud (*Biedermann's Centralblatt für Agrikultur Chemie*, Vol. IX, No. 10) states that in pure wines the separation of glycerin can be easily and accurately effected. In plastered samples the wine is concentrated to one-third of its volume, and treated with hydrofluosilicic acid, and then with alcohol, in order to remove alkalies. Barium hydrate is then added in slight excess, the whole concentrated *in vacuo*, and the residue is exhausted with a mixture of alcohol and ether.

SANITARY JOTTINGS.

The *American* states that the excitement about malaria and sewer-gas has reached such a point in New York that, in the Fifth Avenue Hotel, Sturtevant House, and other prominent caravansaries, the stationary wash-stands and pipes have been removed from many rooms, the old-fashioned pitchers and basins being substituted.——Mr. George Brooke, colliery proprietor, Shepley, has been fined £17, including costs, for neglecting to comply with the Mines Regulation Act, by permitting impure ventilation, and neglecting to have the mine properly examined and reported upon before the men went to work.——The following resolution has been adopted by the Cambridgeshire and Ely Chambers of Agriculture:—'That this chamber is of opinion that beer be so far placed under the Adulteration Act that when other ingredients than malt and hops are used in its manufacture it shall always be advertised as such.'——The Wednesbury Local Board, to obviate opposition to the Walsall Sewage Scheme, on the ground of the Walsall Corporation requiring land in the district of Wednesbury, which hereafter may be required by the Board for sewage purposes, have appointed Mr. Pritchard, of Birmingham and London, to report on the matter, and especially as to the suitability of a scheme for Wednesbury of other lands than those in question.——At the half-yearly meeting of the Improved Industrial Dwellings Company, Sir S. Waterlow, the chairman, presiding, the report, which recommended a dividend at the rate of 5 per cent. per annum, was adopted. It is a noteworthy fact that the average annual death-rate in the Company's buildings for the last 16 years has been 16.7 per 1,000, against 23.4 in the metropolis generally.

NOTICES OF MEETINGS.

THE SANITARY INSTITUTE OF GREAT BRITAIN.

At the anniversary meeting of the Sanitary Institute of Great Britain, held at the Royal Institution, Albermarle Street, on Thursday, July 14th, the Right Hon. Earl Fortescue in the chair, an address was delivered by Prof. F. S. B. F. De Chaumont, M.D., F.R.S., Chairman of the Council, entitled 'Modern Sanitary Science' (published at page 43), and the Medals and Certificates were awarded to the successful exhibitors, held at Exeter in October 1880. At the close of the address, the Chairman (the Right Hon. Earl Fortescue) called upon Dr. A. Carpenter to propose a vote of thanks to Prof. F. S. B. F. De Chaumont, M.D., F.R.S., which was seconded by G. J. Symons, F.R.S. Earl Fortescue, in putting the motion, spoke of the pleasure with which he had listened to the address, and fully endorsed the wisdom of the paper, and spoke of the interest he had formerly taken in the sanitary condition of the army. A vote of thanks to Earl Fortescue was moved by W. H. Michael, Q.C., and seconded by E. Chadwick, C.B.

THE SMOKE ABATEMENT EXHIBITION.

A MEETING was held on the 27th ult., at Grosvenor House, Park Lane, to receive and consider a report from the Smoke Abatement Committee on the subject of an exhibition and trials of improved heating and smoke-preventing appliances, to be opened at South Kensington in October next. The exhibition in question will be held in the East and West Arcades, and in buildings adjoining the Royal Albert Hall; and gold, silver, and bronze medals, together with certificates of merit, will be awarded upon the report of a special committee. It will be opened on Oct. 24th and closed on Nov. 26th. Dr. Siemens moved the first resolution, declaring that the present smoky condition of the atmosphere of London injuriously affects the health and happiness of the community, besides destroying public buildings, deteriorating perishable fabrics, and entailing in various ways unnecessary expenditure. The speech of Dr. Siemens was a powerful argument in support of the principles thus enunciated, and was warmly cheered. Sir Henry Thompson, in seconding the motion, pointed out that the admixture of unburnt fuel in the shape of smoke with the atmosphere must of necessity be prejudicial to those who had the misfortune to breathe it. He also showed by illustration how highly desirable it was on all grounds of health that the air should be perfectly free from smoke. Dr. Quain, Mr. Spencer Wells, and Mr. G. J. Romanes supported the proposition, which was carried unanimously. Other resolutions were carried, and it was resolved by the meeting to support the efforts now being made to reduce the evil arising from coal-smoke, and to assist in raising the funds necessary for constructing and carrying out, on a practical scale, the competitive testing of the various appliances to be shown, and for providing suitable prizes, medals, etc.

NEW JERSEY STATE SANITARY FAIR.

THE success attending the exhibition of sanitary appliances at the State Fair of New Jersey in 1879 was so great as to induce the State Board of Health to make such an exhibition a permanent feature at them. This year the Fair, which is held near the city of Newark, will open Sept. 19, and continue for one week. The classification of articles in the sanitary exhibition, in which awards will be made, is as follows:—

CONSTRUCTION MATERIALS, ETC.—Samples of Building stone, Concrete or other Material; School-room Furniture and Appliances; Pipes, Tile, etc.; Wall Paper and House Decorative Materials; Sanitary Pottery, etc.; Sanitary Models for care of animals.

HEATING AND VENTILATING APPARATUS.—For warming Houses by Flues, Steam or Hot Water; Steam or Gas Cooking Apparatus; Stoves for Heating or Cooking so as to avoid gas and dust; Chimney Cowls and Caps; Specimen Ventilators of all kinds.

DRAINAGE AND WATER SUPPLY.—Drainage Plans or Sanitary Maps; Specimens of Soil and Organic Matter from 'The New Jersey Experimental Station'; Water Supply Apparatus, as Cisterns, Flush Tanks, Filters, Coolers, Sinks, etc.

BATHING APPARATUS AND BATH ROOM FIXTURES.—Bath Tubs and Connections; Best Water Traps and Grease Traps; Dry Earth Closets; Best Pan, Hopper and Plunger Water Closets; General assortment of Plumbers' Work and Material; Gas and other Lighting Material and Fixtures; Electric Light Fixtures.

Druggists' Samples, Disinfectants; Preserved Foods, Health and Condensed Foods, Invalid Preparations; Refrigerators, Food Preservers, Yeast Powders.

Excavating and Odorless Apparatus, Outbuilding Models and Miscellaneous Sanitary Goods.

Life and Labor Saving Apparatus; Life Boats and Preservers or Life Rescue Apparatus; Health Lifts—Gymnasium Apparatus; Sick Chairs, Beds, and other Sick-room Conveniences; Invention and Appliances for relieving constrained positions or for diminishing health-risk in various industries.

Food Adulteration and Testing Apparatus.

Intending exhibitors should address all letters of inquiry to E. A. Osborn, C. E., Middletown, N. J., or to the State Board of Health, Trenton, and articles for exhibition should be directed to the New Jersey State Fair, Waverley, care of the New Jersey State Board of Health. Foreign exhibitors can obtain any desired informatton by addressing the Secretary of the New Jersey Board of Heath, E. M. Hunt, care of Trübner and Co., 58, Ludgate Hill, London.

ORIGINAL PAPERS.

T DISEASES ARE COMMUNICABLE MAN FROM DISEASED ANIMALS USED AS FOOD?

By FRANCIS VACHER,
Medical Officer of Health, Birkenhead.

except the disease known by the presence of parasites, and the disease known by the pre- of nematoid parasites, it is surprising how few diseases ordinarily met with, or likely to occur, en suspected of being communicable to man. this exception because the etiology of tape- and trichiniasis up to a certain point is well food, and the case against meat infested with ed parasites is clearly proved. Medical men, lly, are probably agreed, not only that certain entozoa in meat are capable of retaining for long periods, and entering upon a new of existence when received with food by human but that allied entozoa may possess an equal y for retaining vitality and developing in host, as for instance, those discovered and ed by Mr. Power of the Local Government

With this exception, then, the only animal s there is now or has been any ground arding as transmissible to man through in- meat are:—1. Cattle Plague; 2. Swine d; 3. Epizootic Pleuro-Pneumonia; 4. Foot- outh Disease; 5. Anthrax and Anthracoid es; 6. Erysipelas; and 7. Tuberculosis.

e Plague was suspected of being transmissible uman subject because of the supposed resem- between it and enteric fever. In both diseases the more obvious symptoms was diarrhœa, both, conspicuous pathological lesions were n the small intestine. Even Gamgee, who that there was any true similarity between the and human disease, called cattle plague 'con- typhoid fever of the ox'; and referring to the on of the small intestine of beasts he had ed, says:—'As a rule, the membrane is more reddened and deprived of its epithelium, and bt the reddened Peyer's glands have a per- appearance, and at all the apertures there le yellowish-white plugs of exudation.' Dr. son, also, who was from the first opposed to ory of a relationship between the human and disease, and after much research affirmed that e plague 'there are no sub-mucous deposits, ne of the lesions running through the definite which I am familiar with in the typhoid or fever of man;' yet adds, 'it is right to mention, r, that in all the cases which I have examined, f the solitary glands, and sometimes certain omponent glandules of Peyer's patches, have atly enlarged, filled with a soft cheesy matter, letimes even ulcerated on the surface.' A semblance in physical signs during the pro- the diseases, and again, in *post mortem* ap- es, led foreign pathologists astray; the dis- re pronounced identical, and inasmuch as few localities enjoying complete immunity eric fever, cases in which the bovine disease ead to man were cited. The fact mainly as proving identity was undoubtedly the in Peyer's glands in cattle plague, and when liscovered that surface ulcerations of these ere not uncommon in healthy animals, the evidence in favour of identity was sensibly weakened. Then the insufficiency of the evidence of the plague having been transmitted as typhoid was pointed out, and much attention was given to the subject by observers at home. Among others, Mr. Simon, Dr. Burdon Sanderson, and Dr. A. P. Stewart, joined in the inquiry, with the result that discrepancies in previous observations were noted, and the resemblance between cattle plague and enteric fever shown to be non-existent.

Nor is enteric fever the only human malady to which cattle plague has been thought to be intimately related. It has been compared to typhus, scarlet fever, erysipelas, influenza, and dysentery; and there are none of these diseases it does not in some points superficially resemble. Then, in August 1865, Dr. Murchison published a paper arguing in favour of the ancient theory that cattle plague was small-pox. He concludes this paper with twelve 'considerations', which, in his opinion, bear out the 'close resemblance [of cattle plague], if not more intimate relation, to human variola.' Pathologists do not now accept any of these theories as to a kinship between cattle plague and any known human disease. They now say: if rinderpest is communicable, it communicates itself, and there are a few instances on record where a human being, after accidental inoculation with fluids from a diseased carcase, has shown a vesicle or vesicles or other symptoms different to those of ordinary pyæmia. Still the possibility of conveying even this mild form of the disease by eating infected meat is not supported, so far as I know, by a single recorded instance; yet experiments whether such food would convey infection must have been tried millions of times.

In the plague which ravaged Italy in 1711, of which such an accurate account is given by Ramazzini, the infected meat was allowed to be sold, and was eaten by the people without ill effects. In 1775, also, when an epizootic of this disease prevailed in southern France, it is recorded by Dufot that diseased carcases formed the animal food of three-fourths of the inhabitants, with the result that for forty years there had not been witnessed so little sickness as during the time this food was in the market. In 1865-66, when the plague overran this country, there was a regular traffic in diseased flesh, but no case of disease ascribed to it; and all through the late French war diseased meat was extensively consumed, and always with impunity. Indeed, looking back through the history of this epizootic for a thousand years (there are abundant references to the disease, at least as far back as the time of Charlemagne), the rule seems to have been to kill and eat the beasts attacked, and no instance has come down to us of disease being caught by the consumer.

This brings me to typhoid fever (so-called) of swine, a malady which also in early times was considered variolous. Indeed, some of the first recorded epidemics have come down to us as swine small-pox, the skin eruption often closely resembling discrete variola, and the incubation period being (according to Sutton's numerous experiments) from thirteen to fourteen days. Other epizootics of pig-typhoid have been distinguished as cholera, scarlatina, quinsy, etc., the prominent symptom for the time being giving the name, and it was really thought that the diseases so described were the equivalents of like-named human diseases. The malady attracted little attention in this country till 1862, when it prevailed in several counties, and Professor Simonds, and after-

wards Dr. Wm. Budd, made an investigation of such cases as they obtained access to. Eventually Dr. Budd in 1865 summed up the information he had gathered, and pronounced pig-typhoid to be the 'exact counterpart of enteric fever in man', and the opinion of so high an authority naturally carried such weight, that for years precautions for preventing the spread of this disease to man were thought necessary and were taken. Finally, by way of adding one more to the many misleading doctrines already current with reference to this disease, Mr. Fleming, in his *Manual of Veterinary Sanitary Science*, has given sanction to the old views of Reynal, Röll, and others, and classed pig-typhoid with anthracoid diseases, a group to which it certainly is not remotely allied. I am glad to learn that Mr. Fleming no longer favours these views. A general or patchy congestion of the skin is, I believe, the one symptom common to anthrax and pig-typhoid, and this is an occasional concomitant of most swine diseases.

Budd's teaching, that pig-typhoid is the exact counterpart of enteric fever in man, has recently, after a most exhaustive research, been found untenable. The ulcerations in the intestine are not connected with the solitary or aggregate glands, and the intimate pathology of the disease shows that there is no real similarity between it and human typhoid. Thus the various views put forward from time to time, as to pig-typhoid being the precise pathological equivalent of various specific human diseases, have been abandoned one by one; and in surrendering the theory that pig-typhoid is kin to human disease, we have yielded our dread of being specifically infected by infected swine. Now authorities regard the meat of such swine as altered in quality and of diminished nutritive value, and when the disease is in an advanced stage as absolutely unfit for food; and when the sale of the meat is stopped, it is for these reasons, and not from apprehension of typhoid fever being communicated to man. Considering how very slight the external signs of the disease are in many cases, and that they are sometimes altogether absent, hundreds and thousands of infected carcases must have found their way into the food markets of this country during the prevalence of the epizootic of 1878-79. Thus, if enteric fever, or anthrax, or scarlatina, could be propagated by means of typhoid pork, it is reasonable to suppose that a few cases would have been traced to this source.

Epizootic Pleuro-Pneumonia, inasmuch as it is a distinctly contagious febrile disease, has been very generally regarded as tainting the whole carcase of the animal affected, and warranting its exclusion from the market. Against this preponderance of opinion, I have nothing to urge. The disease interferes with the due oxygenation of the blood, and this fluid and the flesh are consequently darkened, the repair of tissue is inefficiently carried out, many effete substances are retained, there is simple or plastic exudation into serous sacs, the weakened condition of the capillaries is vouched for by extravasations, and the whole carcase is preternaturally liable to decompose, and beside all this, there must be a specific poison present in every subject. A *primâ facie* case is made out against the meat, and it is justly condemned. The power of the flesh to communicate disease to the consumer is, however, quite another contention, and rests on very slender testimony. Slaughtermen and knackers have suffered from a kind of pyæmia after preparing carcases affected with epizootic pleuro-pneumonia, but these are simple cases of blood-poisoning (not necessarily specific) by The only direct evidence I know of, sho ease may be communicated by the inge thus tainted, is from Livingstone, L Gamgee. Dr. Livingstone describes th peripneumonia, and met with it betwee S. It attacked horses, cattle, goats, she zebras. 'When', says he, 'the flesh of have died of this disease, is eaten, malignant carbuncle, which, when it a any important organ, proves rapidly more especially dangerous over the stomach. The effects of the poison h perienced by missionaries who had ea cooked food, the flesh of sheep really b affected by the disease. The virus in th animal is destroyed neither by boiling n

Dr. Letheby gives the particulars o into the cause of a severe illness affec sons, of whom one died. The outbreal 1860 in the City of London, and all t were found to have eaten of certain sa from a quarter of beef tainted with monia. The symptoms scarcely diffe usually noted in sausage poisoning. count appears in an appendix to the *Fi the Medical Officer of the Privy Counci* that in a convict establishment, where animals affected with pleuro-pneumor larly consumed, there occurred from carbuncles per month among 1,520 pers on the discontinuance of the use of d the carbuncles ceased to appear. It is notice that in these three records it wa pneumonia or its analogue which was anthrax in two instances, and a sort of to other. Now, according to Drs. Grimsh Moore, there is a human disease analogo pleuro-pneumonia. A memoir of this di in the *Dublin Medical Journal* for M the other hand, Reynal states that for the flesh of beasts affected with the dis daily in the north of France, and in the out any objection being raised as to its wl Loiset, also, notes that in Lille the carc pleuro-pneumonic beasts were sold as without prejudice to the health of the co this country, too, such meat has been openly sold since pleuro-pneumonia was about forty years ago.

The common belief in the infectiousr pneumonic meat is, I take it, in part d sistent vitality of the specific contagium retains infective properties after the dea and cattle remain infectious for mont apparent recovery. It is curious, in tl Pasteur's recent observations on the tr anthrax poison by means of earth-wo recorded of pleuro-pneumonia that cattl the disease from feeding on land near the affected. The best evidence again that infection is communicable by ing furnished by the Alfort experiments, 1868 and 1869, when cattle were fed diseased lungs, and made to drink the eased pleuræ, and yet continued perf During the prevalence of the disease, t Gardens, London, were supplied with monic meat, and carnivora fed on it s effects.

* *Missionary Travels and Researches in South*

f Mouth Disease.—The precise nature of
: has been and is much debated. Thus, it
alled *eczema epizootica*, on the theory that
to the familiar sporadic skin disease; and
phtheuse, the name of a malady commonly
ildren; and 'aphthous fever', in recognition
that the eruption is accompanied by in-
nperature. Fleming notices that 'Hadinger
oured to prove that the symptoms are due
tation of a species of leptothrix, similar to
of plants, and Spinola has found the
cans among the epithelium of the mucous
; involved. Bender has also found a fun-
d of *tilletia*—in the efflorescences which
lisease.' According to Gamgee, foot and
ase 'is a contagious eruptive fever, affecting
looded animals, and attacking man, under
:umstances, as readily as any of our do-
drupeds.'

notice of the disease, except some doubt-
is in the classics, is by Valentini in 1695,
s of it occurred among cattle and human
lesse. In 1707 it was present as a cattle
he neighbouring states of Franconia, and
ig year it prevailed in Silesia and Poland.
sequent records of the spread of this dis-
pears to have travelled from east to west.
tions an outbreak of this disease on the
n 1763-64 among domestic animals, and
communicated to human beings. Heu-
:s particulars of an outbreak spreading
urope in 1817. This appears to have
imals only, but ten years later, when the
s again prevalent throughout Europe, it
eople as well as animals in Bohemia. In
sease was again epizootic, spreading from
stward, and at this time repeated observa-
made as to the communication of the
m animals to man. It continued to pre-
ding through Austria, Prussia, Holland,
nd France, and reached England by the
itercourse in 1840. From that year this
s never been exempt from the disease for
hs, it being again and again imported with
:k.

mmunication of the disease to man,' says
idmits of no doubt. The history of the
tbreaks of the disease demonstrates this.
e been many contradictory statements on
, but the symptoms repeatedly noticed in
drinking the milk of diseased cows, are
ible. Very good descriptions of these are
in the *Veterinarian* for 1841.' Dr. Balfour
. Watson published some interesting evi-
ne transmission of foot and mouth disease
milk in the *Veterinary Review*, vol. iv, p.
l. v, p. 187; and Mr. Hislop, in the same
(vol. v, p. 81), records two instances of
ngs taking the disease by inoculation.
one at some length into the history of this
:ause it throughout supports the theory
least we have an animal disease communi-
in. I hold, indeed, that it is proved the
nay be transmitted to man through raw
infected animals, used as food. There is
ictory evidence that it may be induced in
noculation, and probably attendants on
me infected by means of the ropy mucous
rom the mouth, in the same way as grooms
glanders. The question which yet re-
ntful, and on which we have no proof, is,
ease be conveyed by ingested meat? The
strong presumption is, that it can. The local manifestations of the disease are blisters like those produced by scalding water. These ordinarily appear on the tongue and lining of the mouth, on the coronets, interdigital spaces, and occasionally in the nostrils, larynx, pharynx, intestinal tract, perineum, etc. Now experience no less than analogy teaches us, that the specific contagium of the disease is contained in the lymph of these vesicles. Successful inoculations have been effected with it, and it may be that the saliva, mouth-mucus, and milk, owe to it their infective properties. If, therefore, it be admitted that milk received into the human stomach may convey this disease, it is scarcely possible to deny that heads and feet of animals similarly tainted, if used as food, may do so too. The explanation of our hearing of many cases of the disease referred to milk, and rarely or never of one referred to meat, is because milk is commonly used raw and meat always cooked. If a head with a vesicular eruption in the mouth were imperfectly boiled and served to a family, those partaking of it would undoubtedly place themselves within reach of infection.

In 1876, when foot-and-mouth-disease was prevalent in Cheshire, I personally attended three cases of what appeared to be this disease. There was evidence of the malady having occurred in the shippon from which the milk-supply was derived. In each, the initial symptoms were a little sickness and a slight fever. These were followed, in one case after twelve hours, and in the others after twenty-four hours, by the characteristic eruption. Vesicles were noted in the roof of mouth, back of fauces, velum, gums, face, back, and limbs. In one case, all the vesicles did not heal directly after rupture, a few forming little superficial ulcers. This was the most severe case, yet the patient recovered in less than a fortnight. In one case the only vesicles noticed were on the neck and face. It is remarkable that this is the only animal disease to which the term 'epidemic' (upon the people) has been regularly applied, as if Englishmen realised from the first that the visitation was upon them as well as on their flocks and herds.

Under the term *Anthrax*, so many diseases have been included, that the word no longer conveys a definite idea. All animal diseases in which plethora is an obviously predisposing cause or a prominent symptom, certain parturient fevers of cows and ewes, the sanguineous ascites of sheep, and even swine-typhoid seem tohave been grouped together as anthrax or anthracoid diseases. And this classification has the sanction of some of the best authorities on the continent, besides being accepted by the authors of the three best-known manuals on animal diseases in this country.

I need not say that swine-typhoid and some other of the diseases and symptoms thus classed with anthrax, are not truly related. The test whether a disease or symptom should be regarded as anthracic is simple. The presence of the 'bacteridium' of Davaine (the *bacillus anthracis*) in the blood of the subject, is the only absolutely reliable evidence one can have, that a malady undoubtedly belongs to the class of diseases now under consideration.

Three years ago, I stated that there were three tolerably distinct diseases, popularly known as black evil, black quarter, etc. Two of these diseases are alike as regards the organic form found in the blood, and are genuine anthracic diseases, but differ in almost every other particular. They are:—1. Splenic fever (*Milzbrand, sang de rate*); 2. Malignant pustule.

(*Karbunkelkrankheit, charbon externe*). The other, although called carbuncular erysipelas, is only exceptionally accompanied by the development of carbuncles. It has appeared to me that it sometimes is, and sometimes is not, the specific disease of which the bacteridium is the sign. The German equivalent for it is *Mitzbrand emphysem.* In France it could probably be called *érysipèle*, or if considered specific, *charbon externe.* A special interest attaches to splenic fever, because it was the first infective disease the contagium of which was proved to be bacterial. Since 1850, it has been the subject of almost constant study, but many problems in its pathology remain yet unsolved. It is generally a bovine disease, but occurs also in sheep, and is communicable to most animals. It is endemic, and according to Heusinger and Virchow, malarial in character. The staff-shaped bacterium, though motionless, multiplies rapidly in the blood, and the disease may progress to a fatal termination in a day or less, death in such a case being ascribed to splenic apoplexy; or the course of this disease may be slower, the symptoms somewhat resembling typhus in the human subject. This is the true *mal de rate*, and it is the carcases of animals which have died after this manner that are surreptitiously introduced into the meat market. There is no œdema, no abscess, no external local lesion. In malignant pustule, there is a motionless staff-shaped bacterium in the blood, the exact counterpart of the one just referred to, but either owing to some inherent difference in the bacillus received, or to its slower development, the resulting changes in the system of the host are altogether different. The fever induced is sub-acute; there is usually slight anasarca, staining of various parts from blood extravasations and abscesses, carbuncles or pustules. Carcases presenting such evident signs of disease as the above will not be offered for sale as food.

Whether these two diseases are essentially identical, further research will, I doubt not, decide. In the present want of knowledge on the subject, they must both be regarded as true anthrax fever, a disease, the seeds of which are very abundantly sown in every part of the infected carcase. On this point a recent writer says, 'one of the most striking points in the morbid anatomy of anthrax, is the enormous number of bacilli, and the way in which sometimes they crowd the blood and tissues'. You will not require me to say much on the facility with which this disease may be communicated to man. You have lately learnt how workpeople at Bradford have been infected by little bacilli which have travelled all the way from Persia or the Cape; you have learnt how two surgeons, after making a post-mortem on one of these work-people, both caught the disease; and this was not a case of poisoning by inoculation, for there was neither wound nor abrasion. Bacilli can make their way throngh capillaries and large vessels, and they can pierce the skin. This fact has been proved again and again. Witness the following, recorded by Gamgee:—'One of the fine white bullocks of the Roman States was conveyed in a cart to the slaughter-house at Ferrara, in August 1854; Professor Maffei condemned the animal as being affected with carbuncular fever. The animal was buried, but a jobber determined to sell the flesh, and during the night disinterred the carcase. He removed the meat in bags to a hiding-place, and in doing so carried the bags over his shoulders; he had thrown off his jacket and set to work in his shirt. Next morning, a diffuse erysipelatous inflammation set up over the back, notwithstanding that no abrasion of the skin could be detected, and the juice of the meat had had to penetrate through the bags and shirt. In three days the man was a corpse.'

But can the disease be conveyed by food? Experiment shows that it can be as readily conveyed by food as in any other way. If any portion of food ingested contains live bacilli, or their spores, the consumer runs a terrible risk; and the tenacity of life of these organisms is so great, we cannot assign a limit to it. The spores have been dried and wetted repeatedly, and kept in putrefying liquids for weeks, and at the end of four years have displayed undiminished virulence.

A word now about *Anthracoid Diseases.* The malady I have already referred to, *Mitzbrand emphysem*, is one the true nature of which is yet very doubtful. First I would ask, Is this the form of *charbon* investigated by MM. Arloing, Cornevin, and Thomas? I think so. Judging by the description given, the disease is not *sang de rate*, and it is not ordinary *charbon externe*, and it is a *charbon* manifesting itself by more or less localised areas of erysipelas, so-called 'tumours'. The conclusions these observers have formed, are mainly five. Briefly they are as follows:—1. That the disease is inoculable in the ox and certain other animals; 2. That it is transmitted by an organism which germinates in the tissue of the tumours, and is rarely or never found in the blood; 3. That the organism can be filtered off by a plaster-of-Paris filter; 4. That it differs distinctly from the *bacillus anthracis* in its characteristics and effects; 5. That the disease should not be confounded with anthrax. In a letter to the *British Medical Journal*, Dr. Greenfield states that the experiments of these observers were anticipated by him in 1879. He says the two sets of experiments are almost identical in method, and, as far as he can decide, in results also. If, then, this disease be wholly distinct from anthrax, the question of its communicability to man must be left for further research to answer. Till the notice of these experiments attracted my attention, my opinion was, that the symptoms referred to did not necessarily denote the presence of any specific contagium, that they were sometimes manifestations of anthrax, and sometimes of erysipelatous inflammation due to various exciting and predisposing causes.

Blain, which appears to be the name usually given to glossitis, pustules occurring in the mouth, and abscess of the tongue, is probably generally a true anthracoid disease. The so-called 'navel ill' of newly-born lambs, though generally considered anthracoid, is a somewhat malignant form of jaundice; the main morbid appearances are staining of the tissues, pallid conjunctiva, liver softened and engorged, and often containing abscesses, and the blood thick and dark from the presence of effete matters. The two much more common diseases, braxy of sheep and parturient apoplexy, may occasionally doubtless be the result of anthrax poison, but I am of opinion that they are far more frequently perfectly simple diseases. Cows are over-fed on rich food, allowed little or no exercise, and kept in close sheds; and if under these circumstances parturition is obstructed, and there is much straining, it is not surprising that symptoms of compression should occur. As regards braxy, the term not only implies apoplexy, but almost every other malady which visits the flocks of the northern shepherd; thus there is dry braxy, watery braxy, hill braxy, dumb braxy, etc. The one way of obtaining satisfactory evidence that any given carcase is the subject of anthrax or splenic

ver, is by instituting a search for the bacteridium. s it is ordinarily the length of the diameter of a lood-corpuscle, and often much longer, it does not quire a very high power to discover it.

Erysipelas.—The communicability of this disease men from infected food, though exceedingly pro- able, is scarcely capable of direct proof. In the rst place, the disease is quite as common in man as animals, and secondly, it occupies such a unique osition between general and local diseases, specific nd simple diseases, that when it occurs we are not stified in saying whether a contagium has been serted, or otherwise come into existence. Even if a attack followed a meal of erysipelatous meat, any practitioners would consider they had suffi- ently explained the phenomenon by referring it to digestion. However, erysipelas, sthenic or asthenic type, is so often met with, in sheep and pigs especially, at the possibility of its conveying a specific infec- on should not be overlooked. Flesh scarcely show- g physical signs of disease may be actively infec- ve. Before corpuscular infiltration, before effusion, here is a change. Research has shown that the isible line of extension in erysipelas is always ioneered by bacteria in the lymphatics, the same rganisms that are found so abundantly in the ensibly affected parts, the skin, connective tissue, dipose tissue, and the surface of muscles. The act that erysipelas is communicable by inoculation as been long known; and seven years ago Lukomsky roved the identity of induced erysipelas with the atural disease (Virchow's *Archiv*, vol. lx, p. 418). We have therefore only to suppose (1) erysipelas contagium present in the flesh consumed, (2) the lesh imperfectly cooked, and (3) a minute wound in he mouth of the consumer; and we have all the con- ditions requisite for the conveyance of erysipelas to man by infective food.

Tuberculosis of animals is better known by the names *perlzucht* or *pommelière*. The generally rounded shape of the deposits found show what good descriptive names these are, and it is perhaps better to call the malady 'pearl disease', which at least has the advantage of implying no theory as to its nature. That the disease is identical with, or analogous to, tubercle in the human subject, must not be assumed too readily. Animals affected with it do not, as a rule, show signs of phthisis or wasting, and the morbid appearances have no gross resemblance to those noticed in human phthisis; however the micro- scopic characters distinguishing true tubercle are present, and this is of itself strong evidence in favour of the animal and human disease being very near relatives. Still, the history of pearl disease should act as a warning against the unwisdom of assuming anything on imperfect evidence. It was once held that pearl disease was identical with human syphilis, and on this ground the use as food of infected animals was prohibited by many continental states. These restrictions remained in force till about ninety years ago, when they were removed, owing to certain eminent physicians having pronounced the forbidden flesh innocuous.

Those who are engaged only occasionally in meat inspection will be familiar with the appearance of the deposits under the costal pleura and lung pleura, and less frequently on the bronchial glands, and under the peritoneum, especially on the surface of the mesenteric glands. On making a closer examination, in order to ascertain the exact site of the tubercular matter, it is found to be in the sub-pleural and inter- lobular connective tissue, and in the tissue surround- ing glands. Now, what is the situation of tubercle in the human lung? It is in the alveolar cavities. Klein states that the giant cells originate either by the fusion of the alveolar epithelium, or by the exces- sive development of one epithelial cell. And what is the situation of tubercle in the human lymphatic glands? Grey nodules are scattered through the cortex, and as these grow and become caseous the distinction between the medullary and cortical portion is obliterated, and the gland becomes a greyish homogeneous mass. Here is a well-marked distinc- tion between the human and bovine disease. Still, the fact that the characteristic giant cells are common to the deposits found in both diseases, seems with some authorities little short of proof of unity. Identity in the shape of the elementary parts, even if it be perfect (which in this case it is not), is, how- ever, not essential identity. Large multinucleated cells occur also in myeloid tumours, forming, indeed, their distinguishing character, and so closely do they resemble so-called giant cells that tubercle and sar- coma were long since assimilated, and by no less an authority than Virchow. I am aware that against Trasbot and his following, and comparatively old writers, there are arrayed Oscar Schüppel, Villemin, Chauveau, Klebs, Gerlach, Leisering, and several others. Indeed, the weight of recent pathological evidence tells strongly in favour of the identity of the human and bovine diseases.

Supposing that this much-disputed identity were proved, the communicability of the disease from dead oxen to man would by no means follow. With a view of deciding whether man may safely eat cooked muscle from an animal with signs of pearl disease, sheep, goats, pigs, dogs, cats, rabbits, and pigeons have been fed on raw glands enlarged by deposits, on raw 'pearls', and bronchial mucus from affected lungs. The result is almost what might have been predicted. The carnivorous animals remained un- prejudiced, and various lesions, more or less resem- bling tubercle, were set up in the herbivorous animals. In some of these cases it was apparently tubercle that was conveyed, in others, the severity of the symptoms described points to pyæmia, a disease to which induced tubercle is closely allied. I think it will be admitted that there is some disproportion between the communicability theory and the founda- tion on which it rests. My contention is, that direct evidence of human tuberculosis having been conveyed by ingested flesh from animals affected with pearl disease is wanting, yet such flesh is daily sold and bought in the open market, and daily consumed by all classes. The indirect evidence, such as I have referred to, has really little bearing upon the point at issue. A very interesting work has been published by Dr. Creighton of Cambridge, which presents this subject in quite a new light. (A review of it will be found in the SANITARY RECORD of July 15.)

No mention has been made of some diseases, as *variola ovina* for instance, because the affected car- case condemns itself, and people do not try what effects would follow its consumption. Other diseases, *e.g.*, fowl-cholera, have not been referred to, because, though many authorities do not consider flesh tainted with such diseases as wholesome, they have never been regarded as transmissible to man.

Of the seven diseases I have referred to, you will perceive I hold but two, foot-and-mouth disease and anthrax, can as yet be pronounced communicable to man by infected flesh. The remaining five I do not

say are thus uncommunicable, but merely that their communicability at present remains unproved. The fitness or unfitness of diseased flesh for human food, and the expediency of its consumption being permitted or otherwise, are questions, as I have already stated, apart from those now under consideration, and I have expressly striven to avoid them.

HYGIENE OF VILLAGE SCHOOLS: IMPROVED URINALS.

By ARTHUR DOWNES, M.D., S.Sc.C.Camb., M.O.H.

I WAS recently asked by one of the managers of a village school to advise them as to the sanitary condition of their school premises. On inspecting these, I found all the defects which are, unfortunately, so common in the public elementary schools of rural districts. School-rooms, class-rooms, and lobbies were close, badly ventilated, and badly designed for their purpose. The closets were of the old-fashioned privy type, tainting the air of the playing yards, and, in the case of the boys' school, distinctly perceptible in the school-room itself—some eight paces distant only. One huge vault served for a series of privies, so that the entrance of a filth-disease ferment through one closet would infect the whole range—no attempt to alleviate the nuisance of these privies by the use of absorbents, such as dry earth or fine ashes—no endeavour, therefore, to impress upon the children the good effect of a good example in cleanliness.

Surely it is of the utmost importance that our public elementary schools should be kept in a cleanly and wholesome condition; important, not only as regards the present health of the children, but in relation to the influence upon them for cleanliness in their after-life. A large proportion of nuisances round the agricultural labourer's cottage might be prevented by a little care on the part of himself or his wife; and it is, I think, matter of regret that in so many instances no effort is made, either by precept or practice, to impress this on the minds of the coming generation. For example, a practical acquaintance with the deodorising powers of suitably prepared earth would, I incline to believe, effect not less benefit than a knowledge of certain subjects enumerated in the Code.

The urinals of the schools to which I have above referred were exceedingly offensive. In one case, a rough trough, coated with decomposing layers of urates, etc.; in another, a simple swamp of putrid urine, some sixteen square feet in area, represented the urinals provided by the school authorities, and not objected to, so far as I am aware, by the Education Department.

Stinking urinals, other than those of village schools, are common enough, and the chief purpose of the present communication is to direct attention to an improved form of simple urinal, of moderate cost, constructed by Messrs. Hayward, Tyler, and Co., according to my suggestions, which is, I believe, excellently adapted for use in localities where there is no system of water-supply available to lay on. Nothing, in my experience, more promotes sweetness in a urinal than the provision in the receptacle of a standing body of water, into which the urine is passed, whether constantly renewed by a trickle from a pipe led from a convenient water-main, or, where no water-supply exists, periodically loosed off and renewed by hand. I advised the school managers, therefore, to provide troughs made of some smooth glazed material, having at one end a 'standing waste' protected from mischief. Once or twice daily a responsible person was to charge the trough with a pail or two of water, previously discharging, by means of the standing waste, the mixture of urine and water.

On enquiry of various makers, however, I could not find that any urinal, conforming to my requirements, and of sufficiently low price, existed in the market. At my request, therefore, Messrs. Hayward, Tyler, and Co., have designed, and undertaken to supply, a glazed stoneware trough, constructed as a separate piece, in any length up to six feet. At one end of the trough a standing waste in brass seat is fitted, and protected from mischievous interference by a diaphragm and lid with lock. The back of the urinal is fitted with glazed slabs or tiles, inserted on the edge of the trough with a 'rabbit' or groove. The outlet of the trough should deliver into a stoneware siphon trap, and the space in front of the urinal should be paved with glazed bricks, or other suitable impermeable materials, having a sufficient fall to a trapped gully at one end. This space, it may be observed, should be made as narrow as practicable. I believe that this urinal will be found to remain entirely free from the objectionable and offensive coating of urates, and that it affords the best means of abating urinal nuisance in such cases as that which I have described.

THE SCIENCE AND ART OF SANITARY PLUMBING.

ABSTRACT OF LECTURES DELIVERED FOR THE NATIONAL HEALTH SOCIETY,

BY S. STEVENS HELLYER, ESQ.,

At the Society of Arts.

VI.—SOIL-PIPE AND WASTE-PIPE CONNECTIONS, DRAIN VENTILATION, AND FLUSHING.

IN this, the concluding lecture, Mr. Hellyer commenced by observing that what he had to say might appear too full of detail, but if ever we were to arrive at perfection in sanitary plumbing we must pay attention to all its details. A general and roughly carried out sanitary arrangement might do very well for temporary encampments, but places which were to be used as our homes, and the homes of our children, must have every hole and corner lighted and ventilated; every water-closet, sink, bath, and lavatory constructed on sanitary principles; every trap self-cleansing; every waste-pipe, soil-pipe, and drain wholesome; in short, if there was to be no harbouring of filth in the drainage system, it must be perfect in all its details. All branches, whether for conveying dirty water, soil, or sewage, should be connected to their main pipes in such a way that the discharges through them shall pass into the main pipe in the direction of its outfall; and in such a manner as not to foul any part of the pipe, be it a waste-pipe, soil-pipe, or drain, where it would not be cleansed by the flush of water following such discharge.

In fixing a range of water-closets on a floor the branches from them were often made to enter the chief branch on the upper side, and in such a manner that the discharges through any of the minor branches nearest the main stack would foul the chief branch, where it could not get cleansed again until a water-closet more remote from the main stack was used, which might not be for some hours afterwards, and perhaps not for some days. The excrement thus

carried back and deposited would thus have time to dry and corrode before the flush of water was sent into the pipe from the adjoining closet to send such filth away. Therefore, all minor branches into a main branch having only a slight fall, should be made to enter at the side obliquely, and never at right angles to or on the top of the main branch. The junction should be kept well up from the bottom or bed of the main branch pipe, to prevent any matter flowing into the minor branches when travelling through the pipe. It was also an evil to continue on the chief branch pipe for ventilation above the highest of the minor branches, for the discharges from the latter would splash and flow up towards the open end of the chief branch pipe, especially if more than one water-closet were discharged at one time, and as there would be no water traffic through that part of the main branch, it would not only become foul, but would be liable to stoppage—at any rate, sufficiently so to prevent proper ventilation.

No ventilating-pipe should be taken from a waste-pipe, soil-pipe, or drain, at a point which could be closed up by a stoppage or back-flow in the pipe—*i.e.*, the ventilating-pipe should always be connected to the waste-pipe, soil-pipe, or drain in such a way as to make it difficult for discharges sent through such pipings to reach the mouth of the ventilating-pipe to choke it; and the connection should be so made that if anything splashed up into the ventilating pipe it should readily fall back, or drain itself out again. How often did one see a range of lavatory basins fitted up with the branch wastes from them entering the top of the main branch at right angles? When a basin near the main waste in such an arrangement was emptied through a minor branch into the main branch, the contents of the basin would flow both ways, and the suds would hang about the pipe and corrode upon it, unless the basin farthest from the main waste were immediately used. Another evil attending such an arrangement was that there would be a constant circulation of the vitiated air in the main branch from basin to basin, and such bad air, arising from stale soapsuds and other matter adhering to the sides of the pipe, would be breathed by the persons bending over the basins to wash their hands; for in the 'tip-up' basins the impure air would easily come up between the basin and the 'receiver,' and in plug-basins (though the plug might be in its place) the air would easily escape through the overflow arm. Another error often made in the arrangement of lavatory wastes, where a range of basins discharged into one trap, was in taking the main branch into the heel of the trap in such a way that about two-thirds of the length of the main branch always was full of water. When that was the case, how was it possible to change the 'standing water' of the trap and the waste-pipe with a flush of water sent through either of the basins? The body of water standing in the trap and piping might become very offensive from the use of scented soap and the washings-down of the lavatory top, and it would prevent the waste-pipe from being cleansed, for no flush of water could be sent through the pipe with any cleansing force.

When a waste-pipe from one 'fitting' was branched into the trap fixed under another fitting, the connection should be so made that no air could travel from one fitting to the other, as it easily could under arrangements sometimes adopted. If one trap must be made to receive the waste-pipes from more than one basin, sink, bath, or urinal, when fixed adjoining each other, the ends of such pipes should be taken into the trap under the normal level of the standing water. But even that arrangement, though it might do for certain places, was imperfect in principle and faulty in detail, and therefore should never be carried out in fixing sanitary fittings near a living-room or bed-room. In dressing-rooms it was common to find the lavatory-waste connected with the bath-waste, but it was impossible to keep such arrangements absolutely sweet. When two or more waste-pipes discharge into one trap, with their ends under the water-line, the filth carried down one pipe floated up into one or more of the other pipes, and collected and lodged there. Though the matter sent up in that way might only be small in one usage, it became large from repeated usage. The lavatory would most likely be in constant use, but the bath might not be used more than two or three times a week, and when used the discharges from it would not wash out the dried filth, for that would have collected upon the sides of the dip and of the bath-waste, above the discharging orifice. Besides, in such arrangements, a large trap was often used, with small branch-wastes into it from the adjoining fittings, so that the trap could not get properly cleaned out by a flush of water sent into it through such pipes. In such cases, filth collected very quickly in the dip or inlet part of the trap. When, on the other hand, each fitting had its own trap, the water-flushes through it could be made to cleanse every part of it, provided that the water-way from the fitting into the trap was of the same bore, and that the trap was of a self-cleansing form—*i.e.*, a round-pipe trap.

It was still the practice with many country plumbers, where they fixed safes under water-closets, to connect the waste-pipe of the safe with the water-closet trap, and to fix the pipe of too small a size to be of any value in any great overflow of the water-closet. But, supposing the pipe to be large enough to take away any overflow from the closet or leaky supply valve, its connection with the trap of the water-closet, where the stoppage which had caused the overflow had occurred, would prevent the water getting away; and the safe would be of no good in preventing the water from overflowing and doing damage. But the chief evil in such an arrangement was that excremental matter would flow up into the safe and waste-pipe from time to time, fouling the pipe where it would have no chance of being cleaned out again; and every usage of the closet would cause a disturbance of the water standing in the pipe, and make it smell. The evil was much aggravated when the pipe was connected to the cheek or heel of the water-closet trap, with its orifice partly above the level of the standing water, for soil-pipe air would then readily escape through the waste-pipe of the safe into the house.

The system of fixing a separate trap under the safe and taking the waste-pipe from it into the soil-pipe, was radically wrong, though it might, with a 'weeping' pipe to charge it, be an improvement on the method last mentioned. But in a tier of water-closets such traps often got syphoned, and then they became inlets for bad air to the house, and might continue for hours, and even days, unsealed, and all the time the air from the soil-pipe would be escaping into the house, for the water-closet with which they were connected might not be used for days together to recharge them. The only safe way of fixing safe-wastes was to connect a 2 in. or 1½ in. lead waste-pipe to the safe, and carry it through the external wall, leaving its end open for ventilation, except where birds were likely to build in it, or where the frosty air could blow through it to freeze the service-pipe to the water-closet or the

water-closet itself. There was very little fear of that when the ends of such pipes faced the south, and when the service-pipes were protected; but where the ends of overflow-pipes were open to the north or north-east, the air whistled up the pipe and froze the basin water—perhaps breaking the basin and bursting the pipe. It was, therefore, better to solder a brass or copper-hinged flap on the ends of such pipes to shut out the frost, and to prevent birds building in them. When, however, such pipes could be left open, they helped to change the air in the room, with a few perforations in the water-closet seat. Of course, where that was done the space between the top of the basin and the seat must be packed with india-rubber to prevent any draught coming to the occupant; and when there was any frost in the air, a piece of board could be placed over the mouth of the overflow-pipe, but that needed personal attention. The mouth of the overflow-pipe should be enlarged and soldered to the safe, and the 'outlet' end should be kept at least a foot below the level of the safe, so that the weight of the overflowing water might well open the hinged flap where the latter was used. Overflow-pipes to safes under baths or slate or galvanised iron cisterns should be treated in the same way as overflow-pipes to water-closet safes, *i.e.*, a pipe of sufficient size to take off the supply of water to such fittings should be fixed to the safe, and carried through the external wall to discharge, with an open end outside; and, to prevent such pipes becoming inlets to the house for bad air, the ends should be kept well away from all ventilating-pipes to waste-pipes and drains, and from places where any bad air could reach them.

Where stop-cocks were used for supplying a bath with water, or where any supply-valve by leaking dropped its water into a safe, provision should be made in the connection of the bath-waste with the safe for taking off such leakage, for if it were allowed to run down the overflow-pipe in frosty weather, the word 'safe' would be a misnomer, for the dropping water would freeze up the outlet of the overflow-pipe, and then, if an overflow took place, it would soon flow over the safe on to the ceiling. Waste-pipes from cisterns should never be connected with any other kind of pipe. As described for overflow-pipes from cistern safes, waste or overflow-pipes from cisterns should discharge into the open air, well away from all places where any impure air could reach them, for when they discharged over a gully or any other drain-trap, they acted as air-pipes from such traps. Any drain air passing through the trap (caused by the water in the trap having evaporated, or by the disturbing action of discharges into the trap) would pass through the waste or overflow-pipe to the water in the cistern, and contaminate it. It was also a great evil to discharge a waste or overflow-pipe from a cistern into a rain-water pipe, with which might be connected a sink or lavatory waste, for such rain-water pipe was sure in time to become foul, and the bad air arising from it would readily escape through the cistern waste to the water in the cistern. It was all very well to blame water companies for not supplying pure water, but when no great trouble was taken for keeping the water pure—should it ever come into the cisterns pure—we could not very well be angry with the water companies. The other day he was called in to examine the sanitary arrangements of a house which had recently been overhauled and reconstructed. He found about four-fifths of the work well done, but among one or two things imperfectly done was a cistern-waste. The pipe had been disconnected from the water-closet trap and continued, and made to discharge over a rain-water head. The cistern itself was on the attic floor, and placed in a corner of the servant's bedroom. He was not then considering the position of cisterns, so he would say nothing about that, except that the water stored in such a quarter must get contaminated. The waste-pipe acted also as an overflow pipe, and being thus open at both ends, there was nothing to prevent the foul air from the four or five lengths of rain-water pipe over which the waste-pipe discharged, passing to the water in the cistern. The combined sink-waste and rain-water pipe emptied itself into a large gully-trap in the back area of the house, and as such traps, as was shown in a previous lecture, were non-cleansing, every time the water was disturbed, a bad smell was emitted, which partly escaped through the window just over the trap into the house, and partly found its way up the four or five lengths of foul waste-piping, and thence through the cistern-waste to contaminate the water in the cistern and the air in the servant's bedroom. A branch waste from a sink on the third floor was taken into the combined sink-waste and rain-water pipe, but the branch was trapped, showing that the plumber or director of work had an idea of such piping becoming foul, but the mystery was why he carried such a pipe as a cistern-waste into it. Cistern-wastes, he repeated, should discharge themselves well away from all traps and ventilating-pipes. When they could not be made to discharge into a roof-gutter, or on to a flat or yard, and when the only place that could be found was a rain-water head, the standing pipe in the cistern should be treated as a plug, by soldering over its top, and an overflow-pipe to the cistern should be fixed to the cistern as described for the cistern-safe, care being taken that such pipe was of sufficient size to take off the full supply of water to the cistern. If the workman erred in this matter he should err on the side of largeness.

No drain was properly connected with the sewer (or cesspool, as the case might be) which would allow the sewer or cesspool air to get into the drain, unless it was very largely mixed with the atmosphere. Every drain should be trapped off from the sewer by an efficient and self-cleansing trap, and, immediately on the house-side of such trap an air induct pipe should be fixed to the drain; or, better still, if circumstances would admit of it, a large air-shaft should be built from the bed of the drain to the surface-lead of the ground, for the upper part of the drain at such point to be well open to the air. Where the drainage of the house had been carried out on the principles laid down in these lectures, there was no risk in opening a well-ventilated drain to the air, provided the trap used for such purposes was a self-cleansing one, having a good water-seal (to allow for evaporation), and provided, also, that it was only of such a size as to admit of the whole of its standing water being changed by a flush of water sent through the drain. But to fix such an arrangement—say, for instance, in the area of a London house—and to connect it to an old brick drain, saturated with sewage matter, and of such a size that no amount of water that could be sent into it would flush it; or to fix it even to a pipe-drain too large to be flushed out, and, therefore, too large to be kept wholesome, was to run a great risk of getting intolerable stinks at such openings. It required good experience in such matters to treat open drains successfully, but to fix a 9in. trap where a 6in. would be ample, or to fix a 6in. where a 4in. would suffice, was to run a risk of getting bad smells into the house, if the latter was

near such openings, for the contents of the trap would under such circumstances only rarely be entirely changed. Where the outlet end of the drain into such traps could not be left open to the atmosphere—for various reasons, as, for instance, being an old drain which could not be properly flushed out, or because the opening would come directly under or near a window, or close to an opening into the house, or under a covered way where any bad air emitted from the trap or drain would get pent up, to enter the house directly a window or door near the place was opened—then, in such cases, the opening over the top of the air-shaft or trap should be sealed up, and an air induct pipe taken into it for the admission of fresh air into the drain, from a point well removed from the house. Where the end of such induct-pipe could not be kept well away from the windows, doors, or passenger traffic, a mica-valve should be fixed over its mouth to prevent, as much as possible, any drain air escaping through it; or, the induct-pipe could go up to the roof, but in the latter case the pipe should be kept lower than the up-cast pipe of the drain, so as to obtain better results from it. Though the plumber might have nothing to do with fixing such a trap for disconnecting the drain from the sewer, he had generally to do with the ventilating pipes of the drain, for in most cases he was called upon to fix them, especially when they were of lead, and as no drain was properly ventilated unless the air in it was changed, and as that could not be done without an inlet as well as an outlet, the plumber's knowledge of drainage matters ought to extend as far as the sewer. Not that he should be required to plan the drainage of a house, but his knowledge of sanitary matters should be such as to lead him to carry out every part of his work in an intelligent manner. If sewer air were allowed to pass freely into the drain, the whole atmosphere surrounding the upper portion of the house—where the plumber terminated the ventilating-pipes of the drain—would become contaminated, and such vitiated air would often get sucked into the house. If such smells were sufficiently pronounced to call special attention to them, they might get set down to imperfect plumbing; at any rate, there would not be great wisdom in making the plumbing sanitarily perfect, and leaving the drains imperfect, for if a man was to be made ill by breathing polluted air, it might as well come from defective plumbing as from defective drainage. He supposed that at the present time, the larger proportion of the house drains of the United Kingdom were unventilated, and the other portion only imperfectly ventilated.

In the scheme of house-drainage, of which he exhibited a model, he had disconnected each stack of soil and waste-pipe, thereby localising each of them, and that each pipe, as well as the drain, might be perfectly ventilated, he had given each its own inlet and outlet; in fact, he had treated them in the model as they ought to be treated in practice, so as to secure a perfect ventilation throughout the whole system. In fixing ventilating-pipes for upcasts to drains, care should be taken to keep them well above and well out of the way of all openings into the house, as explained under the head of soil-pipe ventilation in the previous lecture, so that the bad air coming out of such pipes might not get into a house through the chimney, skylight, dormer-window, or any other opening. It would really be amusing, were it not for the serious consequences likely to arise, to take note of the ill-considered positions in which such pipes were terminated. Sometimes they were seen placed where no wind could reach them at all; at other times they were left so that the smallest wind might blow the air emitted from them right into a window; and in other places, by crossing and recrossing the roof, they were carried up some tall chimney-stack and terminated at a point so situated that the slightest downward pressure of the atmosphere pressed the bad air from such pipes down the chimneys into sleeping or other apartments. No ventilating-pipe from a drain should be fixed inside a house if it was at all practicable to fix it outside. To prevent the possibility of drain-air escaping into a house from a ventilating-pipe through a leaky joint, broken pipe, nail-hole, or any other defect, such pipes should be fixed outside the house. When such pipes were of lead, and were wanted to stand for a century or centuries, as leaden rain-water pipes would, they should be kept out of the power of the sun as much as possible, for with soldered joints the pipe would have no freedom for expansion or contraction, as in leaden rain-water pipes with slip socket-joints.

DISCUSSION ON SANITARY PLUMBING.

Monday, August 15th.

MR. ERNEST HART, Chairman of Council of National Health Society, in the chair.

Mr. DANIEL EMPTAGE, of Margate, led off the discussion by reading a short paper. As the result of a large number of practical experiments made during the last two years, he (the speaker) had arrived at the following conclusions with regard to trap-waving or syphonage, viz.:—1. That the S or P syphons are, when unventilated, very unsafe, from the fact that they are easily untrapped by waving-out or syphonage. 2. That the cast D, the 'Eclipse', and the V traps hold their seals much more tenaciously than the syphons, but are still very liable, under some conditions, to become unsealed when not properly protected by ventilation. 3. That the old D is very much more difficult to untrap than any of the preceding traps, but even this, when without ventilation, is not safe from syphonage. 4. That the seal of a P syphon, even under the most favourable circumstances with respect to ventilation, is not safe against a rush of water passing rapidly through it. 5. That a well-made S trap, when properly ventilated, and fixed in connection with a fully-ventilated soil-pipe, is very difficult to unseal. 6. That the other four traps mentioned are, when properly ventilated, quite secure from either waving-out or syphonage, and they have the advantage of being so constructed that their connection with the soil-pipe could be made at a much higher level than was possible with the S. They all have, however, the great disadvantage of being more foul. Mr. Emptage went on to say that, while thinking over the matter, it occurred to him that the S trap might be so altered that, while retaining its non-syphoning qualities, it should at the same time allow of a connection with the soil-pipe similar to the others. He had such a trap made, and was very pleased to find it answer his expectations in every respect. In it he still retained the dome of the 'out-go' as in the S. He had subjected this new form of trap to the most severe tests, and found that when it was fully protected by ventilation it was quite safe from waving or syphonage. He had since patented it. With regard to ventilation, to properly ventilate a soil-pipe and trap, careful thought was required. The kind of apparatus, length of soil-pipe

and vent-pipe, also the arrangements below the soil-pipe, must all be taken into consideration, because the diameter of pipe, which would be ample for one arrangement, would be quite inadequate for another. He was very much surprised to hear Mr. Hellyer say that he should be satisfied with a 2-in. vent-pipe, 50 ft. or 60 ft. long, to ventilate a soil-pipe and trap 7 ft. long, and open at the foot. He had practically tried such an arrangement fitted with the five traps before mentioned, alternately, and he found that the only trap which would be quite safe under such conditions was the D. The trap which required the most carefully ventilating was the plain round syphon, and that which required the least was the old D. There was, however, a great difference in the effect which ventilation had upon the two traps. With the syphon the water still rushed through, thoroughly cleansing the trap, and leaving it sealed with perfectly clear water, but the D retained more filth when fitted with an air-pipe than without one. He agreed with Mr. Hellyer in condemning the pan-closet, and the outcome of the experience he (the speaker) had gained since abandoning the pan-closet was that the direct-action closets, such as Phillips's 'Sanitary', the 'Artisan', the 'Carmichael,' and the 'Vortex,' were far superior to several of the more costly ones. Such closets, fixed in a proper manner, with suitable ventilation, and with a flush of two gallons delivered in five seconds, were, in his experience, unequalled for cleanliness. With regard to cowls, he had fixed several on soil-pipes and drains at Margate, both in exposed and sheltered positions, and upon several he had made some careful observations. In one instance he found, during a slight shuffy wind, that Banner's cowl repeatedly stopped mouth to wind, at which times the smoke with which he was testing it escaped at the foot-vent. In another case he found that after the smoke had ceased to issue from Banner's cowl, it came up again if he removed the cowl, and ceased when he replaced it. He tried that three times with the same results. In both these instances he found the plain open pipe quite as effective as with the cowl—indeed, more so. From other observations he was convinced that in cases where the ventilation of the soil-pipes and drains was so arranged that it mattered not whether the current of air passed up or down them, open pipes were best. There were, however, places where it was very desirable, as far as possible, to prevent down-draught, and in such cases cowls were sometimes very useful. In conclusion, Mr. Emptage urged upon all connected with the plumbing trade the necessity of giving increased study to the subject, and expressed his thanks to Mr. Ernest Turner for suggesting, to the National Health Society for promoting, and to Mr. Hellyer for delivering, the lectures.

Mr. P. J. DAVIES observed that a great deal had been said by Mr. Hellyer about D-traps being non-cleansing, but he (the speaker) contended that if such traps were properly made they were as much self-cleansing traps as S or round-pipe traps. Mr. Davies proceeded to show, by experiment, that such matters as pebbles and pocket-handkerchiefs could be washed out of a D-trap by one flush, and he concluded by describing the means of geometrically setting-out an improved form of D-trap contrived by him. The improvement consists, first, in making the 'band' of a width not exceeding that of the outside of the dip, the cheeks being only so far apart as just to admit the dip-pipe between them. Secondly, the improvement consists in making the 'out-go' of the cheeks of such a shape as will most readily facilitate the passage of the contents of the trap outward over the 'band'.

Mr. T. H. COURT did not agree with Mr. Hellyer in saying that S traps were less liable to 'fur' and more self-cleansing than D-traps. Mr. Hellyer had strongly condemned the journeyman plumber for defective work, the blame of which should frequently rest upon architects and others. As foreman of a job, he (the speaker) once had put into his hand a specification, in which it was provided that a ¾-in. service-pipe should be used for the supply of four urinals, four closets, three lavatories, two sinks, and a bath (!). He thought Mr. Hellyer was inconsistent in condemning the pan-closet and yet continuing to supply it. He (the speaker) had had many of them taken out, and when asked what should be done with them, he had always said, 'Smash 'em up, and throw 'em on the heap, for they are a disgrace to any one who fixes 'em!'

Mr. W. P. BUCHAN (of Glasgow) was at a loss to understand the favour in which the D-trap seemed to be held by some of the speakers, and their prejudice against the syphon-trap. Glasgow was no inconsiderable city, and a great deal of good plumbing work was to be found there; yet, as a Glasgow-bred plumber of thirty years' experience, he never remembered seeing a D-trap used there. All the Glasgow plumbing was done with syphon-traps, and syphonage was easily preventible by means of ventilation. It seemed to be forgotten that the ventilating pipe to a trap, if properly made and fixed, killed two birds with one stone, so to speak, for it prevented syphonage, and at the same time prevented the accumulation of foul gases, which would eat away the lead unless carried off. Mr. Davies's experiments with his D-trap were not, to his (the speaker's) mind, altogether conclusive, for pebbles and pocket-handkerchiefs could be more easily cleared out of a trap than urinary matter and flocculent particles of fæces. Much as was to be said against the D-trap, however, it was far safer to use it than to use a trapless closet. Where illness resulting in death arose from the use of trapless closets, the fixers of them ought to be found guilty of manslaughter. He thought that no one could defend the use of trapless closets upon any scientific or hygienic ground. Pan-closets were bad enough, but where they could not be removed, their evils could be mitigated by ventilating the containers, but with two pipes.

MR. H. H. COLLINS said that as so much had been said in condemnation of trapless closets, he felt bound to say that one which he had had in use for several years had answered admirably. A good trapless closet had much to recommend it if properly situated and fixed. Of course, if placed in close proximity to, or in absolute conjunction with, a sewer, it would be a most objectionable appliance to use. He instructed his servant how to cleanse it thoroughly once a week, and had the trap-work polished and cleaned with salts of sorrel.

Mr. HELLYER, in replying said that he was gratified to find that the remarks made by those who had spoken in the discussion were so largely in favour of the observations he had made in his lectures. With reference to Mr. Emptage's remarks on cowls, he would only say that his experience was that cowls were of advantage; they might, perhaps, add about 10 per cent. to the up-current. He had found them, in scores of cases, very helpful. Up-currents of air in soil-pipes could generally be increased by the use of proper cowls. He had tested that at a cost of from £200 to £300. With regard to non-society

men *versus* society men, considered as workmen, he simply stated his conviction, based on experience, when he said that as a rule non-society men were the the best workmen. He wanted the trade societies to be more careful in excluding incompetent men than they had been. He had no more feeling against society men than against non-society men, and had good workmen belonging to both classes in his employ. He never himself asked the question, all he sought being honest, industrious, competent men. He was very glad if, as a result of his lectures, Mr. Davies had been able to improve the D-trap, but he should like it tested with soap-water, urine, and solid excrement, and see these carried through in the same manner. He was very glad the D trap could be made much more self-cleansing than it had hitherto been. He challenged the accuracy of Mr. Court's statement, that anything said by him in the course of these lectures was calculated to do harm to young plumbers. He had done the utmost in his power to help them. His presence, then, and through the course of his lectures, had been for the benefit of young plumbers. With regard to carrying two pots of solder, he simply recommended that in large buildings, or jobs where you have eight or ten pairs of plumbers, two pots of solder should be in use, one for underhand joints and one for coarser joints, the object being to save time. Time was an important element in work, and as an employer of labour he valued time. It frequently hinged upon time whether a master plumber made profit or no profit on a job. As to pan-closets, he had previously explained that he only supplied them under protest, when there was no help but to use them, as in the circumstances he had mentioned. As a matter of fact, irrespective of the job to which he had referred, his firm had almost entirely discarded their manufacture and use, and had not supplied more than thirty during the last three years. On all their circulars it was expressly stated beneath the illustration of the pan-closet, that it was not an appliance to be recommended. He was gratified that Mr. Buchan should have supported by the weight of his experience what he (the lecturer) had said, for Mr. Buchan was well known throughout the country. Notwithstanding what Mr. Collins had said as to trapless closets, he still stood by his condemnation of them. He did think the present generation would take the trouble to wash and cleanse them with spirits of salts. He would almost rather do away with water-closets and have earth-closets if the mould could be passed away at once. He would have all the water-closets on the sewers, so as to do away with pipes. Insurance offices might, he thought, insure the lives of those who live in sanitary houses at a lower premium. Householders were waking up to the fact that if they wished to live healthy lives, they must live in healthy houses.

After some questions as to whether the specimens of plumber's work exhibited at the recent Sanitary Exhibition could compete for the National Health Society's prizes (to which the chairman replied in the affirmative), the meeting closed with thanks to Mr. Hellyer and the chairman.

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THE

SANITARY RECORD.

SEPTEMBER 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE STANDARD OF COWS' MILK.

AN interesting paper has been published by Professor C. A. Cameron, in a recent number of the *Scientific Proceedings of the Royal Dublin Society*, on the composition of the milk of cows. During the winter quarter of 1880, analyses were made of the milk of forty-two cows which were kept at the Government agricultural institution, known as the Albert Farm, at Glasnevin, in the county of Dublin. The morning's and the evening's milk of each cow were each analysed once, and an examination of the mixed milk of the forty-two cows was also made on the 11th of December, 1880. The cows were, as might be expected, good animals, having from one to three crosses of the Shorthorn breed. They were in the house during the period of the experiments; their food consisted of a daily allowance of about nine stone of pulped mangolds and turnips with exhausted brewery grains, together with about one stone of hay. Their ages ranged from four to nine years inclusive. Dividing them into two groups—those aged four and five years, and those aged eight and nine years—a marked difference in favour of the milk of the latter, both in quantity and quality, was noticed. This, however, might easily be accounted for by the process of artificial selection, for while it is only good milch cows that would be kept in the dairy for several years, the younger ones, proved not to be good milkers, would be put into the fattening stalls. The belief that milk becomes deteriorated in quality towards the end of lactation was not supported by these experiments. The quantity naturally became scanty, but the quality improved. The average yield of milk was for each cow 11¼ quarts. In every instance, the quantity of milk yielded in the morning exceeded the proportion furnished in the evening, eight hours intervening between the milkings. Thirty out of the forty-two cows gave richer milk in the evening than in the morning; eleven gave richer milk in the morning than in the evening, while the remaining cows' milk was equally good at both milkings. The increase in the amount of solid matters in the evening's milk was chiefly due to the larger amount of fats contained in the latter. The result of these analyses showed that the milk of well-fed cows in houses, in the last quarter of the year, contains, when poorest, 13.90 per cent. of solid matter, including 4.20 per cent. of fats. The Society of Public Analysts of

Great Britain and Ireland have adopted as a standard for the poorest pure milk 9 per cent. of solids, minus fats, and 2.5 per cent. of fats—a total of 11.5 per cent of solids. While there is little doubt that milk containing less than this percentage of solids is watered or skimmed, still these analyses are considered to show that, so far as Ireland is concerned, the solids, minus fat, may be in pure milk less than 9 per cent.

Experiments such as those communicated by Prof. C. A. Cameron are very valuable; for they complete our knowledge of the composition of cows' milk obtained under different conditions which is still rather imperfect, and they enable us to fix the limits in which the components fluctuate. The value of the above experiments is somewhat diminished by taking and analysing only once the different samples, and by founding all conclusions on the results thus obtained. The proportion in the composition of morning milk and evening milk would very probably have been found more equal for all cows if the trouble had been taken to take the average of several milk samples from each cow. Generally speaking, we may say that the quality of milk increases when the quantity decreases; and it is quite in agreement with this that the milk was found to contain more solids towards the end of lactation. The announced figures for total solids (13.9 per cent.) and fat (4.2 per cent.) are very high; a direct comparison of these figures with similar results obtained anywhere else is scarcely possible, because the methods for analysing milk are rather different, and they do not all give the same results. The standard of the Society of Public Analysts (9.0 per cent. solids not fat, 2.5 per cent. fat) is founded on a large number of analyses, and is related to milk as it is usually brought to sale, that is to say, milk not from one or two cows, but at least from four and more. In such mixed milk the differences in the composition are not so extensive. The minimum, however, fixed for solids, not fat, may be somewhat too high, and a more exact average would be 3.5 per cent. There is an incompleteness in this communication of Prof. C. A. Cameron's experiments; the specific gravity of the milk samples is never mentioned, while the difference in the composition of milk is large enough to allow watering of a very rich milk to be executed to a considerable extent without bringing the solids and fat below the standard. The specific gravity of a mixture of milk from four and more cows is, at a temperature of 60°, very seldom indeed over 1.033, or below 1.029, and a small quantity of water only is sufficient to bring the specific gravity below this limit; therefore, the specific gravity never ought to be neglected in testing and analysing milk, especially not in scientific experiments.

The rather sudden death of Mr. Boyle, the indefatigable Secretary of the Dublin Public Health Committee, has caused wide-spread regret. He was a man who never spared himself in the discharge of his onerous and often unpleasant and dangerous duties, and the citizens of Dublin owe him more than they will ever know.

REPRESSION OF ADULTERATION IN AMERICA.

THE Adulteration Act recently passed by the State of New York was finally approved by the Governor on the 2nd June last. This is what may be called the leading Act for the United States, for, although several Acts for individual States have already been passed by the Legislatures, which differ in only a few minor details from this one, yet the New York Act is the one which, under the guidance of the National Board of Health, has been pressed forward on the consideration of Congress, in order that it may be passed as a National Act, to run through all the States of the Union.

The Act is well drawn, and contains several points of the utmost importance. All questions as to what articles are or are not adulterated are at once settled by the fact that a definition of an adulterated article is included in the Act itself. This definition is, we believe, an almost, if not quite, verbatim copy of that contained in the Essay on Adulteration written by Mr. Wigner, which, as our readers may remember, obtained the first prize offered by the National Board of Health, and has also been recognised by other States of the Union and accepted by some European countries. More than one-half of the difficulties which have occurred in the working of the English Sale of Food Act have been due to the absence of any recognised definition of adulteration, or standard of purity; but so far as can be judged up to the present, the definition which is included in this Act does furnish it, and the technical pleas which have hitherto been almost the only defences made in the proceedings under our English Act, will be prevented.

This law contains, in section 4, one extremely valuable new regulation, by which it is prescribed to be the duty of the State Board of Health to prepare and publish from time to time lists of the articles, mixtures or compounds, declared to be exempt from the provisions of the Act. It is reasonable to suppose that the State Board of Health will do their duty; and if so the State of New York will be saved from all those foolish squabbles as to the desirability or otherwise of selling mustard containing ten per cent. of farina, and pepper containing two per cent. of sand, which have so disgraced our own national administration of the Sale of Food and Drugs Act.

This New York law goes at once to the root of the matter, by providing in sections 1 and 6 that any person who sells an adulterated article of food or drugs, or any person who refuses to serve any analyst or other agent with a sample of food or drugs for the purpose of analysis, shall be deemed guilty of a misdemeanour, and punished by a fine of fifty dollars for a first offence, and one hundred dollars for each subsequent offence.

It is satisfactory to know that this is now the law of the State of New York; but in another sense it is even more satisfactory to know that the brunt of the

in carrying such a law through the State legis- has been borne by private enterprise. The *ıry Engineer*, from first to last, for more than en months, has never ceased writing and press- rwards a law which should act in the way that ids fair to do.

THE VACCINATION ACTS.

inal returns of the Vaccination Officers of the l Unions of England and Wales relating to en whose births were registered in the year are tabulated in the annual report of the Local nment Board just issued. From the tables in the report, it appears that of 891,743 child- ıose births were registered in that year, more 35 per cent. had been successfully vaccinated; 10 per cent. had died unvaccinated; and a fraction (.005 per cent.) had contracted small- ithout being vaccinated. About .01 per cent. certified as insusceptible of vaccination in ıuence of the operation having been three performed upon them without success; and ıer cent. were cases temporarily postponed :ount of the children's state of health, leaving 4 per cent. of cases unaccounted for. The najority of these were cases which, on account movement of the parents after registration of ths, the Vaccination Officers professed them- as being unable to trace. It thus appears that entire children born, about 4¾ per cent. ı unaccounted for as regards vaccination. roportion is the same, as regards the kingdom lly, in 1878, as in 1873-1877; but in the me- s it has been diminished by about one per while in the rest of the country it has risen .1 to 4.3. In the six years ending in 1878, the otal of children not finally accounted for as s vaccination is 236,602, of whom 58,498 belong metropolis.

ough the metropolitan returns show some ss, they still leave much to be desired; and ce that an improvement is practicable is to be in the fact, that in several districts that contain tion that must be exceedingly difficult for the ation Officers to deal with—such as St. ;, Westminster, Poplar, and Stepney—the mi- character of the London population did not serious difficulty to the work of securing vac- n. The Chairman of the Metropolitan Asy- ;oard recently estimated that there are at least) unvaccinated persons now living in London. ident that a population of this magnitude, un- ed against small-pox, offers abundant material : maintenance of the disease. Add to the inated the much larger number of persons wing to defective primary vaccination, or to of re-vaccination at the age of puberty, are iently protected against attack; and it can y be matter of astonishment that small-pox ics still occur in the metropolis from time to

he eleven registration divisions of England, vo, besides the metropolis, show as many as cent of the births unaccounted for. In the ı and South-Western divisions the proportion v three per cent. Of individual Unions, there re than fifty in which the cases unaccounted ount to less than one per cent. of the births; seven of these Unions every child born in nd living at the time when the returns were made, had, without exception, been successfully vaccinated. Such completeness is, of course, more attainable in country districts from which there is not much rapid migration of the population; but the report contains a list of twenty Unions, all of which contain populations of a considerable size, in none of which the number of children unaccounted for in 1878 reached three per cent. of the births. On the other hand, there are altogether seventeen Unions in which the proportion of children unaccounted for equals or exceeds ten per cent., three of these being the metropolitan districts of St. Giles, Shoreditch, and St. George-in-the-East. The most important of the others are Dewsbury, Keighley, Lincoln, Leicester, Cheltenham, Burton-on-Trent, Banbury, and Hastings, in all of which there is local opposition to vaccination.

In their duty of supervision of public vaccination, the Local Government Board in 1880 directed the inspection by their Medical Inspectors of 303 Unions, comprising 1,498 vaccination districts. To the Public Vaccinators in 839 of these districts grants of money were made, the sum awarded amounting to the aggregate of £12,762 8s. The Board report that the system of awards continues to work satisfactorily, and they state confidently that the general standard of vaccination in England is now such as to leave little to be desired.

The National Vaccine Establishment continued its operations during the year, the number of applications for lymph received and dealt with amounting to 10,301. The stations supplying this lymph were inspected as usual, with the result that the selection and mode of storage of the lymph was ascertained to be satisfactory. All such lymph was microscopically examined in the Department before issue, and the Board repeat their statement of last year that no suggestion of the inoculation of syphilis was heard of in any one of these cases; and that they have good reason for thorough confidence in the purity and efficiency of the lymph.

NOTES OF THE MONTH.

THE SANITARY CONDITION OF HOTELS.

THE sanitary or insanitary condition of hotels and lodging houses is taking hold of public attention, and certainly the subject is of great importance. When those visitors to the Congress who are expected in Dublin in October arrive, we can place their minds at rest on the subject of hotel accommodation. There are, at least, two large hotels in Dublin which in sanitary matters are greatly in advance. Some months before the Sanitary Commission was appointed to examine the hotels in Rome, the proprietors of the Shelbourne Hotel, Stephen's Green, and the Gresham Hotel, Sackville Street, Dublin, determined, of their own free will, to set their houses in order for the security of their customers. They placed their establishments in the hands of Messrs. Maguire of Dublin, the sanitary engineers; and on taking over the works again from them, they engaged the services of Dr. Charles A. Cameron, Chief Medical Officer of Health for Dublin, to examine the improvements independently and report thereon—with this result, that in each hotel visitors may read on every landing, for their comfort and security, the certificate of the Chief Officer of Health vouching for the sanitary condition of the house. Mr. Ernest Hart recently sojourned at the Shelbourne Hotel, and noted the

perfect sanitary arrangements with great satisfaction, and especially approved of the system of certificates. Every precaution is plainly observed in these two hotels to prevent the smallest possibility of any deterioration in the quality of water supplied. The pure Vartry water is laid on to all points, and is filtered specially for drinking. Every soil-pipe is ventilated day and night by a draught of fresh air flowing through. Every bath and basin, and every trough, waste, and overflow pipe, is cut off from connection with the drain. Dublin needs, to secure a prominent place as a healthful city, not only improved dwellings for her poor, but also a reform in the sanitary arrangements of the houses of the rich. On some other occasion this question will be examined, in the hope that its consideration may lead to good results. There is a movement in the right direction, but so slow, that years must elapse and many lives be lost before the goal is attained; every helpful word of advice you give will be a benefit to Dublin, and tend to make her as she ought to be, the second sanitary city in the kingdom.

THE BOYLSTON PRIZE FOR 1882.

One of the subjects proposed for dissertations, for the Boylston Prize for 1882, is Sewer Gas, so-called (the gas found in sewers); What are its Physiological and Pathological Effects on Animals and Plants? An Experimental Inquiry. The author of a dissertation on this subject considered worthy of a prize, will receive a premium of $300. The committee on the prize are appointed by the President and Fellows of Harvard University. The President of the Committee, to whom dissertations should be sent, is Dr. D. H. Storer, 182, Boylston Street, Boston.

DISINFECTION OF SHIPS.

In devising a system for the thorough disinfection of vessels on board of which cases of small-pox had occurred, the Austrian Government, through its medical experts, resorted to the following method:—Sulphur to the extent of twelve grains per cubic meter of the space to be disinfected was first burned in an earthenware vessel or basin, placed in the centre of a mass of sand to prevent all risk of fire. Every article of clothing, all the linen, etc., were hung across the cabin, the latter being then hermetically closed for three hours, and afterwards exposed to the strongest possible draughts of air for twelve hours. Finally, the walls, floor, ceiling, etc., were washed with one kilogramme of lime or one-half kilogramme of chloride of zinc to every hundred litres of water.

THE PREVENTION OF INFECTIOUS DISEASES.

Wisconsin has recently added a new and important chapter to her health laws for the prevention of infectious diseases, which the State Board is freely circulating. Among other things, it provides that any person knowingly labouring under small-pox, diphtheria, scarlet fever, or other dangerous, contagious, infectious, or pestilential disease, who shall wilfully enter a public place or a public conveyance, or shall in any way wilfully subject others to danger of contracting his disease, or any person who shall knowingly and wilfully take, aid in taking, or cause to be taken, a child or other irresponsible person, while labouring under any of the aforesaid diseases, into a public place or public conveyance, or shall in any way knowingly and wilfully subject others to danger of contracting any of the aforesaid diseases from such child or irresponsible person, or any person who shall knowingly and wilfully subject others to danger of contracting any of the aforesaid diseases from the dead body of a person deceased thereof, or any person who shall in any way knowingly and wilfully expose, aid in exposing, or cause to be exposed, a child or other irresponsible person, to danger of contracting any of the aforesaid diseases, shall be deemed guilty of a misdemeanour.

TYPHOID FEVER AT BRIDLINGTON DUE TO INFECTED MILK.

Dr. Parsons has presented to the Local Government Board a very interesting report upon an outbreak of enteric fever which occurred last autumn at Bridlington, and which was traced to the use of specifically polluted milk. Dr. Parsons' description of the cause of the epidemic leaves no room for doubt that it was in fact due to the drinking of milk supplied by one particular retailer, in the vicinity of whose premises typhoid fever had existed before the outburst commenced. It appears that in the last week of September and the first fortnight of October a large number of persons residing in various parts of the district, but especially in one part of it, were attacked simultaneously, or in rapid succession, with symptoms of typhoid fever. It was soon observed that the great majority of the households in which the fever had broken out obtained their milk from a dairyman residing about a hundred yards from the place where the first cases occurred. The house in which the milkman lived was in close proximity to cow-stables which had inhabited rooms on three sides of them and over them. The yard immediately behind was unpaved, had no slope to allow of surface water running off it, and at the time of Dr. Parsons' visit was in a foul condition. Under the surface of this yard was a well 18 feet deep, sunk in a loose gravelly soil, and covered only with boards and earth. During the hot weather, it was stated that the ground over the well was cracked; and thus the heavy rains which followed could the more readily wash foul matters into it. This well was but a few feet from the cow-shed and from a huge pile of manure; and two privies with covered middens were 13 yards distant. The water, raised by means of a pump, was used both for dairy purposes and for domestic use; but it was, upon analysis, pronounced 'a very bad water, evidently largely contaminated with sewage'. Neither the dairyman nor his wife (elderly persons) suffered from the fever; but a girl, aged twelve years, who lived with them as a servant, went home to her parents ill of fever, from which two of her brothers had shortly before suffered. Three cases of fever occurred in the early part of October in the house adjoining the dairyman's. The well water was stated to have been used for rinsing the cans only after having been boiled. The cows drank it; but none of them, it was stated, appeared in ill-health at the time of the outbreak. Upon enquiry at the houses served by the dairyman (83 in number), 48 undoubted and severe cases of fever were found in them. The Medical Officer of Health did not reckon up the number of households attacked, and a part of his notes had unfortunately been lost; but those that remained contained a record of 48 households, in 17 of which there had been unquestionably cases of fever. In each of four other households a

ubtful case had occurred, and only 27 houses had caped. That the outbreak and subsequent spread the fever were due to an infected milk supply is ident from the sudden and wide-spread character the outbreak; the apparent absence in some cases other circumstances which might account for the currence of the fever; the especial incidence of e fever upon the households supplied with milk om the suspected dairy; the undoubted pollution of e water used for dairy purposes, and the possibi- y of its being contaminated by specific typhoid fection; and the speedy decline of the epidemic ter its cause had been ascertained and measures of ecaution adopted.

EFFECTS OF SANITARY MEASURES ON THE PUBLIC HEALTH.

The last report of the Local Government Board ontains a somewhat interesting comparison between ie death-rate in England and Wales for each of the st four decennial periods, as indicating the effect hich recent sanitary measures appear to have had pon the public health. The general death-rate, hich from 1841-50 was 22.4; from 1851-60, 22.2; nd from 1861-70, 22.5; was, from 1871-80, 21.5 per 000. The zymotic rate, which was from 1851-60, .11; and from 1861-70, 4.14; was from 1871-80, 3.36. he fever rate, which from 1851-60 was 0.91, and om 1861-70, 0.88, was in 1871-80, 0.49 per 1000. rom these figures, it appears that, speaking gene- ally, the death-rate of the country remained station- ry from 1840 to 1870, but that in the period 1871-80 fell from 22.5 (of the previous decade) to 21.5, a eduction equivalent to nearly 4½ per cent. It may herefore be roughly estimated that about a quarter f a million persons were saved from death in the en years 1871-80, who would have died if the death- ate had been the same as in the previous thirty ears. If twelve cases of serious, but non-fatal, ill- ess be reckoned for every death, it follows that bout three million persons, or over one-ninth of the hole population, have been saved from a sick bed y some influences at work in the past decade, which ad not been in operation previously. The case, ndeed, is still stronger than this. The death-rate of ural districts is habitually lower than that of urban listricts; and as the population is steadily concen- rating itself, more and more, into the towns, the leath-rate of the whole country would tend to in- rease, if the other circumstances affecting it re- nained the same. When we find that this tendency as been so much more than merely counteracted, it ecomes interesting to see where the gain has been, nd to endeavour to trace some of the causes to hich it may be due. Comparing, then, 1861-70 vith 1871-80, it is seen from the foregoing figures, hat, of the entire reduction of 1.0 in the death-rate, nore than three-quarters (4.14 − 3.36 = 0.78) comes nder the head of 'The Seven Zymotic Diseases'—of he diseases, that is, which are most influenced by anitary improvements, and most amenable to con- rol by the action of sanitary authorities. And of his three-quarters, just half (0.88 − 0.49 = 0.39), or hree-eighths of the entire reduction, is in 'Fever', he disease which, more than any other, shows itself n connection with such faults of drainage, of water- upply, and of filth accumulation as it is within the province of good sanitary administration to remove. It is particularly significant that since the year 1870, when the fever death-rate was 0.80 per 1000, it has fallen pretty steadily, year by year, down to 0.32 in 1880. Then, in the five years 1871-5, the fever death-rate was 0.61; in the five years 1876-80 it was 0.38.

HEALTH QUESTIONS: SOCIAL SCIENCE ASSOCIATION.

The following are the special questions in the Public Health department to be discussed at the Dublin Congress, October 3rd to 8th:—1. Is it desirable that hospitals should be placed under State supervision? 2. Is it (*a*) desirable that there should be a system of compulsory notification of infectious diseases; and, if so (*b*), what is the best method of carrying such a system into effect; and (*c*) what is the best method of enforcing the isolation of cases of infectious disease? 3. Is any further legislation desirable in order to more effectually prevent the overcrowding of dwelling-houses.

PARKES MUSEUM: INTERNATIONAL MEDICAL AND SANITARY EXHIBITION, 1881.

The Medical and Sanitary Exhibition organised by the Committee of the Parkes Museum, was open for the last time on Saturday, August 13th, when the number of visitors, exclusive of season ticket holders, was 1,221, making a total of 24,333 visitors for the four weeks during which the Exhibition has been open, allowing only for one visit by each season ticket holder. During the day, the secretary, Mr. Mark Judge, visited the different exhibitors for the purpose of ascertaining their opinion as to the success of the Exhibition. The exhibitors, generally, expressed themselves as well satisfied with the result, some going so far as to say that they had done an exceptional amount of business, owing to the fact that a very large proportion of the visitors had been either medical men, architects, or engineers. The representatives of the exhibitors, who have been in daily attendance during the Exhibition, marked their appreciation of the arrangements made for their convenience by presenting, on Saturday, a small purse of gold to the Superintendent, Mr. Smithson. The closing of the Exhibition was taken advantage of by the St. John Ambulance Association to give a demonstration of ambulance practice, and during the afternoon a large number of the visitors assembled in the Conservatory to witness the practice, which was conducted by Major Duncan, Mr. Cantlie, of Charing Cross Hospital, Mr. Furley, Dr. Crookshank, and Surgeon-Major Baker. Prizes were competed for by squads of the Grenadier Guards, the Finsbury Rifles, and the Metropolitan Police. Mr. John Eric Erichsen (the chairman), Dr. Poore, Dr. Steele, Mr. George Godwin, Mr. Rogers Field, and other members of the Exhibition Committee, were present during the day. It is expected that the prizes which have been awarded will be distributed at the Annual Meeting of the Parkes Museum in the autumn.

An automatic washing machine is the latest contribution to household appliances, and hails from New Zealand. A working boiler-maker at Christchurch, New Zealand, has hit on the idea of placing a copper boiler, perforated at the bottom and round the edge, inside an ordinary washing copper, leaving half an inch between the two. The water boiling with great force through the holes in the upper boiler, in which the clothes are placed, effectually dispenses with the need for rubbing and scrubbing. The report of Mr. E. Wakefield, M.H.R., on the Ashburton Exhibition, at which this invention was shown, records the conviction that 'if anything would wash a black man white, that would.'

THE PUBLIC HEALTH
DURING AUGUST 1881.

THE mean temperature during August at the Royal Greenwich Observatory, was 59°.1, and 1°.7 below the average August temperature in 100 years. During the first week of the month the temperature was, for the most part, above the average; but a cold period set in on the 9th, and lasted throughout the remainder of the month. The mean temperature was above the average on five of the first eight days, the hottest day being the fifth, when the mean was 59°.3, showing an excess of 6°.6. The mean was below the average on 26 of the 31 days of the month, the coldest day being the 31st, when the mean was only 52°.2, and 8°.1 below the average. The mean temperature of the three summer months, June, July, and August, was 61°.1, exceeding that of the corresponding periods of 1879 and 1880, and 0°.9 above the average temperature of those months in 100 years. Rain was measured at Greenwich on 17 of the 31 days in last month, to the aggregate amount of 3.9 inches, which was an inch and a half above the average August rainfall in 61 years. The rainfall of the first eight months of this year amounted to 15.5 inches at the Greenwich Observatory, and was almost identical with the average amount for that period. The sun was above the horizon during 449.1 hours in August, and 135.1 hours of bright sunshine were recorded at Greenwich. This amount, although nearly 29 hours in excess of that recorded in August 1880, was 5.9 below the average amount in the corresponding month of the four years 1877-80. South-westerly winds prevailed almost constantly throughout the month.

In twenty of the largest English towns, dealt with in the Registrar-General's weekly return, 24,760 births and 15,008 deaths were registered during the five weeks ending 3rd instant. The births were equal to an annual rate of 34.0 per 1000 of the aggregate population of the twenty towns, as now estimated by the Registrar-General from the numbers enumerated in April last. This rate showed a further slight decline from the rates prevailing in recent months, and was 1.4 below the rate in August 1880. The birth-rate last month did not exceed 29.3 and 30.3 in Brighton and Norwich, while it ranged upwards to 38.8 and 39.5 in Leicester and Nottingham. The rate did not exceed 32.7 in London, and averaged 35.2 in the nineteen provincial towns.

The annual death-rate in the twenty towns during the five weeks of August averaged 20.6 per 1000 of their estimated population, against 25.7, 18.4, and 24.5 in the three corresponding periods of 1878-9-80. The death-rate last month showed, in consequence of the unseasonably low temperature that prevailed, a considerable decline from that which prevailed during July, when the mean temperature exceeded the average. The lowest annual rate of mortality in the twenty towns last month was 14.4 in Plymouth. The rates in the other towns, ranged in order from the lowest, were as follow: Bradford, 16.8; Norwich, 17.5; Bristol, 18.0; Brighton, 18.4; Portsmouth, 18.5; Birmingham, 19.1; Oldham, 19.2; Wolverhampton, 19.5; London, 19.9; Sheffield, 20.1; Leeds, 20.5; Salford, 20.5; Manchester, 20.9; Sunderland, 21.5; Newcastle-upon-Tyne, 22.3; Nottingham, 24.5; Liverpool, 25.3; Hull, 27.9; and the highest rate during the month was 30.0 in Leicester. In the nineteen provincial towns, with an aggregate population very little less than that of London, the annual death-rate during August averaged 21.3, whereas in London it did not exceed 19.9. The high death-rates during last month in Nottingham, Liverpool, Hull, and Leicester were mainly due to excessive zymotic fatality: scarlet fever was epidemic in Hull and Nottingham, and diarrhœa in Leicester, while the excess of zymotic fatality in Liverpool was caused about equally by measles, scarlet fever, and diarrhœa.

The 15,008 deaths from all causes in the twenty towns during the five weeks ending 3rd instant, included 1899 from diarrhœa, 570 from scarlet fever, 372 from measles, 323 from whooping-cough, 197 from 'fever', 170 from small-pox, and 89 from diphtheria. Thus 3,620, or rather more than 24 per cent. of the deaths from all causes were referred to the principal zymotic diseases; these were equal to an annual rate of 5.0 per 1000 in the twenty towns, showing a decline of 1.2 from the high rate that prevailed from the same diseases in July. This decline of zymotic fatality was mainly shown in the deaths from diarrhœa, measles, and whooping-cough. The zymotic death rate last month was equal to 4.7 in London, and averaged 5 3 in the nineteen provincial towns, among which it ranged from 0.8 and 2.3 in Plymouth and Bradford, to 7.1 in Liverpool, 7.7 in Nottingham, 10.6 in Hull, and 12.4 in Leicester.

The fatal cases of diarrhœa in the twenty towns, which had been 2,022 in the four weeks of July, declined to 1,899 in the five weeks of August. The annual death-rate from this disease, which was equal to 0.49 and 3.47 per 1000 in June and July, declined again last month to 2.61; it was equal to 2.2 in London, and averaged 3.0 in the nineteen towns. In these nineteen towns, the diarrhœa death-rate ranged from 0.6 in Plymouth, 1.1 in Bradford, and 1.3 in Oldham, to 4.1 in Nottingham and 8.2 in Leicester. Diarrhœa in these towns was not half so fatal last month as in the corresponding period of 1880, but the relative excess in Leicester was as marked last month as in the previous August. Next to diarrhœa, scarlet fever was the most fatal zymotic disease in the twenty towns last month, and the annual death-rate from this disease, which had been equal to 0.42 and 0.66 per 1000 in June and July, further rose to 0.78 last month; the death-rates from this disease showed the largest excess in Hull, Nottingham, and Leicester. The 372 deaths from measles were equal to a rate of 0.51, showing a considerable decline upon the rates that prevailed in recent months. The fatality of this disease was greatest in Liverpool and Sheffield. The 323 deaths from whooping-cough were equal to a rate of 0.44, against 0.61 in each of the two preceding months. Fever, principally enteric, caused 197 deaths in the twenty towns during August, causing an annual rate of 0.27, whereas the rate from this disease did not exceed 0.20 either in June or July; fever fatality was greatest in Newcastle-upon-Tyne, Nottingham, and Portsmouth. The 89 deaths referred to diphtheria were equal to a death-rate corresponding with that which prevailed in July; 49 occurred in London, 13 in Portsmouth, 5 in Birmingham, and 4 both in Liverpool and Salford. The epidemic fatality of diphtheria in Portsmouth showed but a slight decline, and 91 deaths from this disease were recorded within the borough during the first eight months of this year. Small-pox caused 170 more deaths during the five weeks of August, of which, no less than 163 occurred in London, and but 7 in the nineteen other towns; of the latter number, 3 were recorded in Liverpool, 2 in Oldham, 1 in Leeds, and 1 in Hull. Judged, however, by the returns of the Metropolitan Asylum Hospitals, the prevalence of small-pox in London showed a further decline during August. The number of small-pox patients under treatment in these hospitals, which had declined from 1,552 to 852 during June and July, fell to 557 at the end of August; of these, 130 were under treatment in the "Atlas" hospital ship, and 88 were accommodated at the Convalescent Camp Hospital at Darenth. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 317 and 152 in June and July, further fell to 144 in August. The largest proportional fatality of small-pox in the Metropolis again occurred during August in the east and south groups of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year to births, averaged 200 per 1000 in the twenty towns last month, against 132 and 234 in June and July. Infant mortality last month was equal to 194 per 1000 in London, and averaged 206 in the nineteen other towns. The proportion in the several towns was in a great measure governed by the fatality of diarrhœa, and ranged from 128 and 137 in Plymouth and Bristol, to 234 in Hull, 238 in Norwich, and 406 in Leicester.

The fatality of diseases of the respiratory organs showed a further considerable decline during August. The average weekly number of deaths referred to these diseases in Lon-

don, which had steadily declined from 513 to 168 in the first seven months of the year, further fell to 144 during the five weeks of August, which was 7 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from those diseases in London did not exceed 2.0 per 1000 in August, against rates declining from 7.2 to 2.3 in the seven preceding months. In Liverpool the death-rate from the same diseases last month was equal to 3.8 per 1000.

During the five weeks of August the causes of 285 deaths in the twenty towns were not certified either by a registered medical practitioner, or by a coroner; these uncertified deaths were equal to 1.9 per cent. of the total deaths registered. The proportion of uncertified deaths, which did not exceed 0.8 per cent. in London, was nearly four times as large, or 2.9 per cent. in the nineteen provincial towns; it was but 0.4 and 0.5 in Portsmouth and Birmingham, whereas it ranged upwards to 4.2 in Sheffield, 4.4 in Oldham, 5.8 in Hull, and 7.8 in Wolverhampton.

In the outer ring of suburban districts around London, having a population now estimated at 958,996 persons, the annual death-rate from all causes during August did not exceed 17.4 per 1000, against 18.3 in July. The annual death-rate from the principal zymotic diseases also declined from 4.3 in July to 4.1 August, but was very slightly below the rate prevailing from the same causes within registration London. The fatal cases of small-pox in the outer ring during August were 23, and showed a decline from the recorded fatality in July. The deaths from scarlet fever, however, showed an increase, and those from infantile diarrhœa had scarcely declined.

INTERNATIONAL MEDICAL CONGRESS.

STATE MEDICINE SECTION.

THE Section was opened on Wednesday, August 3rd, by Mr. SIMON, C.B., F.R.S., who delivered an address on Vivisection, which has been published in full in the *British Medical Journal*.

THE EXPERIENCE OF THE UNITED STATES IN RECENT YEARS WITH REGARD TO ASIATIC CHOLERA AND YELLOW FEVER.

By JOHN S. BILLINGS, M.D., Surgeon, U.S. Army.

1. As regards cholera, this experience accords in most points with the conclusions of the Conferences of Constantinople and Vienna. The quarantines of the United States have not been, and are not now, capable of preventing the importation of cholera. In the United States there is special danger of such importation through the personal baggage of emigrants. When the disease has been introduced, more can be done in stamping it out, and in the way of personal prophylaxis, than in other pestilential diseases. The systematic disinfection of excreta, clothing, and persons, and the securing pure food and drink, are the means to this end. 2. As regards yellow fever, the epidemics of 1878 and 1879 have produced considerable change in the opinions of American physicians. The majority believe that it is a specific disease—not connected with marsh malaria—due to a specific living cause, and not indigenous to, or endemic in, the United States, in which country it is always due to importation. 3. This importation might, to a great extent, but not entirely, be prevented by a proper system of quarantine, without causing undue obstruction to travel or traffic. The word quarantine includes what the Vienna Conference terms systems of medical inspection, and does not necessarily imply detention either of ships, persons, or cargo, beyond the time needed for cleansing and disinfection. 4. Measures which, without entirely preventing, will delay the importation of yellow fever, have a much greater relative importance than in other diseases, and for this reason inland quarantines are of much more value in this disease than in cholera. 5. The experience of 1879 is favourable to attempts to stamp out yellow fever by systematic cleansing and disinfection of the infected localities, and also by measures of depopulation and the formation of camps. 6. Much of the practical difficulty in dealing efficiently with yellow fever being connected with diagnosis, attention is called to a recent attempt to formulate a diagnosis of this disease for sanitary purposes. 7. From the practical as well as the scientific point of view, the great desideratum at present as regards both cholera and yellow fever, is a test for the presence of their causes, other than the production of the disease in man. 8. Yellow fever cities are filthy cities, and yellow fever ships are usually foul ships. But we know of no city in the yellow fever region that is clean enough to make this rule of much importance as regards them, and it would be very unsafe to act on the supposition that a clean ship cannot become infected. 9. The greatest difficulties in the way of preventing the introduction of cholera and yellow fever into the United States, are due to the want of reliable information as to the sanitary condition of foreign ports, and of vessels sailing therefrom. To overcome these difficulties, co-operation between the great commercial nations of the earth is desirable. 10. Some account is given of the effort of the National Board of Health to secure this co-operation through the International Sanitary Conference of Washington, and of the results of this Conference. The conclusions of the Conference are not satisfactory, and will give no practical result. The proper basis for an international agreement on the subject is the following:—*a*. Each Government should secure prompt and reliable information as to the existence of cholera, yellow fever, and plague, within its boundaries, and especially in its seaports. *b*. Each Government should communicate this information to the other parties to the agreement, and especially to their consuls, or consular agents, at the seaports. In case of the occurrence of either of the above-named diseases, the communication should be made with the least possible delay—by telegraph, if practicable. *c*. When bills of health are required by any one of the contracting Governments, such bills should be signed by its own agents at the port of departure, and these agents should have the right to make such inspection of the ships as is necessary to enable them to certify to the bill of health. *d*. The agents charged with the duty of signing the bill of health should also have the privilege, in case either cholera, yellow fever, or plague exists at the port of departure, of making use of the telegraph to notify their respective Governments of the departure of ships from such infected ports. *e*. The bill of health should be of the form approved by the Washington International Sanitary Conference—it should be neither a clean bill, nor a foul bill, but a certificate in detail as to the sanitary condition of the port, and of the ship.

ON THE MEASURES TO BE PURSUED TO PREVENT THE COMMUNICATION OF YELLOW FEVER FROM COUNTRY TO COUNTRY, OR WITHIN ANY ONE COUNTRY.

By ROBERT LAWSON, L.R.C.S., Inspector-General of Hospitals.

There being no re-agent for the yellow fever poison known at present, except the human body or those of animals subject to the disease, the occurrence of yellow fever among persons in any given locality merely proves that the poison of the disease was active there. The outbreak of the disease may have been preceded by the arrival of cases from elsewhere, and those first attacked having been in communication with them; but unless the influence of local causes can be excluded, this does not justify the conclusion that the disease was derived from the imported cases. In every instance in which the action of local causes could be excluded, it has been found that extensive and continued importations of yellow fever cases failed to communicate the disease to those who visited them, however frequent or prolonged their exposure to the emanations from the sick, or their discharges. Yellow fever, then, being closely connected with locality, can such places acquire the power of giving off the emanations which cause the disease without

the previous introduction of the poison, either by persons or shipping, or articles they have brought from some other point where the disease was already prevailing? There are many facts to show that localities have acquired this power without its being communicated from other places where the disease was already in existence, by the means indicated, and this having been established for some localities, it is clear that it may apply to anyone where the disease arises, and the possibility of this being so must be excluded before another mode of origin can be admitted. The localities which acquire the power of emitting this cause of yellow fever may be either places on shore, or ships. The former always present a certain amount of moisture, either on the surface or some little distance below it, in which case it is covered by an open porous soil; the latter have always had a quantity of fetid mud in their bilge, and if this be not removed, and the ship thoroughly cleansed, susceptible persons exposed to the emanations from it in warm weather, may continue to be attacked by yellow fever for months, or even years, after it first displayed the power of generating that disease, and at points far removed from that where it was originally acquired. The localities which emit yellow fever poison on land are not unfrequently small, and distinctly circumscribed; and during the night, when the emanations from these are not rapidly diffused upwards, they may be conveyed a considerable distance by currents of air sufficiently concentrated to cause the disease among persons exposed to them, though those out of the direct course of the current remain unaffected. The same has been observed in connection with ships; and the question naturally rises whether vessels with a foul bilge actively emitting such emanations—if in the vicinity of the shore—could impart to a locality there, suitable for the reproduction of the material, the germ from which it proceeds. Though often alleged, there is nothing worthy of the name of scientific investigation on this point. Can clothes or other porous materials—exposed to the emanations from a locality emitting yellow fever poison, take up and retain a sufficient quantity of the material to cause the disease in persons at a distance who first open them out? Cases of this description are often mentioned, but, as with personal communication of the disease, those who put them forth seldom or never think of excluding the possibility of local causes having excited it; the facts, therefore, do not fairly establish the conclusion. From the position here laid down it follows that:—Yellow fever can pass from country to country without the intervention of man, and he can neither arrest its progress, nor indicate what countries it will affect. A ship with a source of yellow fever in her, may retain the power of exciting the disease in those who come within range of the emanations from this, for months or years, and may in the meantime have gone far from where she was originally infected; but the sick from her may be landed and treated without risk to their attendants or the population generally. It has not been established that a vessel with a source of yellow fever in her, can impart the germ of the disease to a locality on shore suitable for its development, near which she may lie, and so produce a shore epidemic. Persons who have contracted yellow fever in one locality may proceed to another, where the disease runs its course without any of those around them being affected, provided there be not a cause for it in operation at the spot. To prevent the formation of spots capable of emitting the poison, thorough drainage of the ground in the neighbourhood of occupied buildings is required; covered drains and sewers should be thoroughly flushed and disinfected; bush removed from the vicinity; and there should be no garden ground, which is frequently watered, near dwellings. When yellow fever appears, it is prudent to remove the population from the locality if this can be done; if not, then they should sleep in apartments as much raised from the ground as can be obtained, and every night at sunset the windows looking towards any unhealthy ground should be shut, and kept so until after sunrise next morning. When a ship arrives with a source of yellow fever in her, she should be anchored where the emanations from her may be diffused without injury to the surrounding population. The hatches should be opened, and means taken to disinfect the bilge, and the crew removed from her. It is not clear whether the clothing and bedding of the crew can convey the poison in sufficient quantity to prove injurious to others, but there can be no harm in opening the chests, and exposing the contents fairly to the air, and in washing such as require it. The necessity for burning the clothing and bedding of persons who have died of yellow fever is not justified by experience.

Dr. FAUVEL (Paris) considered that any general code of rules for all countries would be very inexpedient, the measures of prevention depending on so many different considerations. Thus, cholera reaching Europe by the Red Sea would need most stringent measures at Malta, and a comparatively mild treatment in England.—Dr. CARLO CUTURI (Pisa) supported Dr. Fauvel's views that the prophylactic measures must be modified according as the climatic and other conditions varied.—Dr. J. MURRAY fully concurred with Dr. Billings as to the impossibility of guarding every avenue by ordinary quarantine measures, especially in these days of fast steamers and railways. Both in India and elsewhere absolute protection seemed unattainable.—Prof. DE CHAUMONT, referring to Indian experience, gave instances in proof of the communicability of cholera by water.—Dr. COLAN described his successful action in staying yellow fever at Port Royal, Jamaica; the sick were isolated and placed in quarantine, and all articles of clothing, etc., dealt with by carbolic acid or heat.—Dr. ACLAND, F.R.S., pointed out that each country is able to know with precision the existence of a disease, and it ought to be able to find out the local causes of such disease, and the best local means of prophylaxis; both the causes and the prophylaxis varying in different countries, and even within the borders of the same country. He trusted that the adoption of the principles of Drs. Billings and Fauvel would lead to an understanding between nations as to what is possible in the international prevention of disease.—Dr. DRYSDALE also spoke as to the contagious nature of cholera; and then Dr. Billings and Mr. Lawson replied.

MEASURES BY WHICH TO PREVENT THE DIFFUSION OF DENGUE.

By JAMES CHRISTIE, A.M., M.D., Lecturer on Public Health, Glasgow.

1. The Dengue epidemic of 1870-75;—its prodromata, origin, and diffusion. Prior to the outbreak, there had been a visitation of cholera at Zanzibar; the city was in a thoroughly bad sanitary condition; and within the city and in its immediate precincts, there were about 20,000 imperfectly buried corpses. Dengue was not imported, but originated *de novo*. The principal diffusion was northwards, towards the Red Sea ports, and from thence to British India, etc., etc. The native designation was 'Ki-dinga.' 2. The Dengue epidemic of 1824-28 read by the light of the epidemic of 1870-75. The main facts are as follows:—In 1821 cholera was epidemic in East Africa. About 1822 or 1823 Dengue was also epidemic, its native designation being 'Ki-dinga.' In 1824 the disease appeared first in the Bombay Presidency, afterwards in Rangoon, and finally in Calcutta. In 1827 it appeared in St. Thomas, where it was called 'Dandy fever'; but in the Spanish possessions it was termed 'Dunga,' and afterwards 'Dengue.' On the hypothesis that it originated at Zanzibar, the northern line of diffusion was identical with that of 1870; and the diffusion southwards, towards the West Indian islands, was possible by means of a slave-trade which then existed between the Portuguese settlements in the Mozambique Channel, and Cuba and Brazil. 'Dandy' is evidently a corruption of the original designation 'Dinga;' the Spanish term 'Dunga' being but a slight alteration of the original. 3. The epidemics of break-bone fever in the West Indian islands and South America. These epidemics seem to bear the same relation to yellow fever epidemics, that the former bear to cholera epidemics. 4. The relationship between Dengue and Break-bone fever. They seem to be distinct varieties of the same disease, the infective virus of cholera in the one case, and of yellow fever in the other, being so modified by the products of human decomposition, as to give rise

severally to these diseases. The only mode of dealing with epidemic dengue consists in prevention, viz., by improved sanitary conditions in tropical districts; and by more careful modes of disposal of the dead, more especially of those dead from virulent epidemic diseases. During the epidemic, isolation is impossible, and quarantine can be of little avail.

Dr. EZRA HUNT (United States) considered that the hybridization of disease, either naturally, or as the result of experiment, must now be recognised, a special type attaching to disease according to the locality or the person invaded.—Dr. NORMAN CHEVERS, as the result of his experience in Bengal, could not view dengue as connected with cholera.

ON THE PRINCIPLES THAT SHOULD GUIDE US IN ATTEMPTING TO PREVENT THE DIFFUSION OF DISEASE.

By F. DE CHAUMONT, M.D., F.R.S., Netley.

1. Brief *résumé* of the diseases, the prevention of which seems feasible. Division into groups, such as:—*a*. Those immediately contagious, *ex.*, small-pox. *b*. Those mediately contagious, *ex.*, cholera, typhoid fever. *c*. Those that are preventible, but, so far as is known, not contagious, *ex.*, paroxysmal fevers. 2. Means of prevention:—*a*. Direct, *ex.*, vaccination. *b*. Indirect, *ex.*, general hygienic precautions. 3. Isolation and quarantine:—*a*. When is isolation useful and practicable? *b*. What is the value of quarantine? Desirability of more extended knowledge of the incubation of disease, and of the symptomatology of the period of incubation. No attempts at the prevention of disease can be considered likely to be successful which do not include constant attention to every particular of hygienic precaution, including purity of soil, water, and air, cleanliness of habitations, proper nourishment, healthy employment, and moderation in all things.

THE IMPORTATION OF INFECTIOUS DISEASE INTO LIVERPOOL, ITS DIFFUSION AND THE MEASURES OF PREVENTION.

By J. STOPFORD TAYLOR, M.D., Medical Officer of Health, Liverpool.

The introduction of typhus by the great emigration of Irish people during the famine of 1847. The great overcrowding of the city by a large number of people who took up their permanent residence there,—people unaccustomed to town life, and having no knowledge or means of obtaining a livelihood. The constant danger to the health of the community, as evidenced by the outbreak and persistence of epidemic disease, more particularly typhus, during the period known as the 'Cotton famine', extending from the year 1862 to 1866, and the prevalence of relapsing fever in 1870 and 1871. The large number of foreign emigrants passing through the city—the outbreak of cholera on board ships in 1866 carrying emigrants to America—the disease in the emigrant lodging houses, and two months afterwards becoming epidemic amongst the general population. The powers possessed to prevent the introduction of infectious disease are very limited—the necessity of placing the population in a sanitary condition to lessen the liability to contagion—the measures adopted to improve the condition of the city and the people—the regulations for governing lodging and sublet houses, emigrant houses being registered as lodging houses. The number of emigrants passing through the city last year, and the arrangements made by the shipping companies for their conveyance and support during transit, and the number of sick sent to hospital. Foreign emigrants are examined by physicians, on their arrival in Liverpool, appointed by the shipping companies, and by Government physicians on going on board ship. The Corporation of Liverpool, as Port Sanitary Authority, examines into the sanitary condition of ships frequenting the port; removes the passengers or crew who may be suffering from infectious disease to hospital, and disinfects the clothing, etc. The Corporation have taken about seven acres of land on the margin of the river, and erected a hospital for the reception of infectious cases coming into port by vessels, and also with the view of accommodating in huts or tents the passengers who are not suffering, but have been in contact with the sick. This course would not be adopted, except in such cases as that of the emigrant ships previously referred to; all ordinary cases of infection being taken to the hospitals in the city.

ON THE PREVENTION OF SCARLET FEVER.

By DAVID PAGE, M.D.,
Medical Officer of Health, Westmoreland.

It may be stated at the outset that those precautions which, in respect of scarlet fever, prove successful for the protection of a neighbourhood or a household, must also be the real defences for the community which is immediately concerned; and therefore for other and more distant communities. All national or international preventive measures against the diffusion of such a disease as scarlet fever must, in their essence, be measures for effectual individual control. These measures ought to give practical effect to the questions:—1. What ought to be done with the infected individual or patient. 2. How long may the patient continue to be a possible source of infection. 3. What is the latest period, after exposure to infection, at which the disorder will show itself in a person who has received the infection into his system? 4. How soon may a person who has been exposed to risks of infection be pronounced safe against attack? Two main clinical facts are involved in these questions:—1. The duration of the incubation period of scarlet fever. 2. The modes of exit from the system of the fever poison. A knowledge of the incubation period essential in disposing, for the time, of a person who, having been exposed to chances of infection, may have contracted the disorder. In this case an appreciation of the maximum period of latency required. Literature of subject vague and untrustworthy. The author's observations coincide with those of late Dr. Murchison, and may be summed up:—1. The common duration of the incubation period in scarlet fever is from twenty-four to forty-eight hours. 2. The period is occasionally longer, lasting from three to five days. 3. In rare instances, practically absent, the symptoms following quickly upon exposure to infection. Based upon these conclusions, the author requires that a person who has been exposed to infection should, before being pronounced safe from its probable consequences, be kept under surveillance for a week, and only then, after change of clothes, and baths, be set at liberty. Of even greater importance than this, is the action which ought to be taken in regard to the fever patient himself. This action is rendered difficult by reason of diversity and inconstancy of what are commonly looked for as the diagnostic features of scarlet fever. An estimate of the real value of desquamation of the cuticle as a trustworthy guide in preventive measures, must be based upon knowledge of irregularity of process in relation to time, quantity of eruption, or intensity of attack. Error of regarding infective process at an end before cessation of desquamation and *for some considerable interval afterwards*. Importance of pathology of scarlet fever as regards the nature of the eruption and the tendency to albuminuria, as a guide to preventive action and treatment. The author's experience points to the necessity for isolation of the scarlatinal patient for a period of not less than eight weeks; and he would state the rule of Nature to be, isolation for this period as a minimum, and in cases of protracted desquamation or of relapse, until entire cessation of the process, *and for a fortnight afterwards*. For the rest, official action should include:—1. Due provision for the separation of the sick from the healthy in the way of hospitals and convalescent homes. 2. Notification of the occurrence of cases of infectious disease. 3. Continuous supervision of all scarlatinal convalescents. 4. Control of school attendance of children belonging to infected families. 5. Disinfection and purification of infected houses and things.

How to Limit and more or less practically to Nullify the Force of Contagion and Infection by Holding the Breath while in Immediate Contiguity with the Patient.

By Henry Mac Cormac, M.D., Consulting Physician to the Belfast Royal Hospital.

Diseases termed infectious, and propagated by miasma from man to man, are communicated, and only communicated, as I believe, by inhalation. Avoid the inhalation of the miasma of disease, and you may prevent the transmission of disease. If we assume the aggregate area of the lining of the lung air-cells to amount to 40 square feet, we see at once what an enormous avenue to the admission of the germs of the disease is thus furnished when brought into such close proximity with the circulating fluid. If we arrest for the moment the act of respiration, we may also, in so far, arrest the transmission of disease. If the proposition I set forth, namely, that infectious disease is communicated by inhalation, be proved correct, a greatly increased measure of safety for all who have to deal with such, that is to say for physicians, nurses, relatives, and, in a sense, at one time or other, the entire community, is obtainable. The poison of infection, when adequately diluted, does not by inhalation communicate disease. Take, for example, a case of plague or typhus, or Asiatic cholera, or scarlet fever, or diphtheria. In the immediate proximity of the patient, the poison is highly concentrated and highly communicable. At a certain distance, so that the poison shall be adequately diluted by admixture with pure fresh air, it ceases to be communicable. By sufficient ventilation, the poison of infectious disease is rendered, in fact, incommunicable. In a long experience, I never saw the poison of fever, when I had the control of the ventilation, transmitted from the sufferer to another person. I have seen typhus fever actually extend to nine persons in one household, when ventilation, or air renewal was not attended to. Dr. Jackson, when dealing with the plague in Morocco, prescribed for the patients with entire personal immunity, from an open window, elevated but a few feet above them. I have myself had much to do with Asiatic cholera, and always held my breath when in immediate proximity with the sufferers. I never experienced the malady, though everyone associated with me, nurses and medical men alike, suffered more or less. For years I had charge of a fever hospital, and was never attacked by typhus fever, though all the doctors, whether predecessors, associates, or successors, had it. The hospital nurses, without exception, suffered. In private practice I enjoyed the same security, and I have attended typhus fever in the severest forms, and in the vilest and worst ventilated abodes. A French physician, M. le Dr. Laval, médicin major des hopitaux, it is stated in the *Moniteur de l'Armée*, August, 1874, finding himself on leave in the regency of Tripoli, and hearing that the plague was raging at Merdj, about twenty hours' journey from Bengazi, repaired thither, and without medical co-operation, devoted himself without remission to the aid of the terrified population, preventing the malady indeed from spreading, but, to the infinite regret of everyone, falling at last a victim to his own superb humanity. This admirable person, I believe, would not have perished, and multitudes of others might have escaped likewise, had he and they, as I did, held in the breath, taking in a good chestful beforehand, while immediately contiguous to the sick. I am anxious not to exaggerate the value of the precaution whose adoption I urge. I have waited thus long in order, if I could, only to realise fresh assurance. I simply state my own convictions and experience, and leave them for the consideration and adoption, should they haply approve, of the noble profession of which I am an humble member.

The discussion on the group of papers dealing with the home contagia was then opened by Dr. Varrentrapp, of Frankfort, who referred especially to Dr. Gilbert's contention that enteric fever at Havre had been caused by the damming back of underground and foul water by means of a main sewer. Dr. Varrentrapp did not think we were justified in accepting this explanation of the epidemic, and he pointed out that the pollution of the ground referred to had been of long-standing, and that it probably did no more than afford a suitable soil for the poison when once this had been introduced into it. Besides which, no information had been given to show that the obstruction to the flow of water had recently taken place, whereas it was well known that water made itself a channel of outfall by the side of all large sewers. In Germany the influence of a lowered ground-water has become more and more acknowledged as favourable to certain epidemic influences, but other conditions had to be noted as well, thus the period at which the soil at a depth of several feet reached its highest temperature, was also favourable to a similar development. Dr. Varrentrapp concluded with an exhortation as to the exercise of the utmost caution in drawing conclusions from imperfect data.—Dr. Ezra Hunt (United States) referred especially to Dr. de Chaumont's paper. He considered it an important question how far such direct methods of prevention as are typified by vaccination may not be extended, for it is certain that much depends upon the channel by which infection is introduced into the system. However severe the result of inoculating an animal beneath the skin with the virus of pleuro-pneumonia, that method of its introduction prevented the disease from attacking its favourite organ, viz., the lung, perhaps owing to a sort of dilution of the poison, the result of lessening the amount which might otherwise have been introduced by the extensive surface presented by the air-cells of the lung. Special stress was also laid upon the necessity of applying hygienic measures to persons as well as to places, so as to lessen their susceptibility to infection. It may be possible by personal hygiene to do much which will maintain an antiseptic condition of the system, which shall enable it to resist such infection as it may be exposed to, and by the sustained use of antizymotics during what would otherwise be an incubative period, to limit or prevent the development of infection.—Dr. Dahl (Christiania) drew attention to the spread of infection by means of rags amongst those occupied in the manufacture of paper, and expressed the opinion that, short of boiling no disinfection was efficient.—Dr. Beveridge (Aberdeen) drew attention to the voluntary notification of diseases in Aberdeen, and pointed out that notwithstanding the large sum paid for the certificates, there had, owing to the lessening of infectious disease, been a large saving in the expenditure by the sanitary committee. He expressed his disbelief in the process of disinfection by heat, and gave instances to show that even when 300° F. was reached in a stove, a single fold of cloth prevented the temperature from rising within that fold.—Dr. Thorne Thorne, one of the Hon. Secs., desired to draw the attention of the Section to two points. The first related to the influence of a notification of infectious diseases in securing the isolation of the sick, and so in preventing the spread of infection. He first instanced the case of Leicester, where every four or five years several hundred deaths had resulted from scarlet fever, the fatal cases varying from 265 to 299 in each epidemic referred to. In June 1879 the disease again became epidemic, and bid fair to assume very large proportions, but in September of that year a system of notification of infectious diseases came into operation and by means of it 159 first attacks, occurring in crowded streets and alleys, were removed to a hospital provided by the Sanitary Authority, the result being that whereas in the months September and December 1870, when no hospital and no notification existed, as many as 217 scarlet fever deaths had been caused, only 65 resulted during the same period in 1879. The case of Warrington was also referred to, scarlet fever having somewhat suddenly appeared in all parts of the borough in the year 1880. Out of 77 first attacks reported during a stated period under a system of notification of infectious diseases, 72 were isolated, and the disease as an epidemic practically ceased. Instances were also recorded, shewing how a voluntary system of notification had failed, owing to the unwillingness of a single medical practitioner to join in it. The next subject to which the speaker addressed himself related to the subject of disinfection by dry heat. He stated that, as the result of an

extensive enquiry, he had no hesitation in expressing the opinion that the stove designed by Dr. Ransome, F.R.S., of Nottingham, and manufactured by Messrs. Goddard and Massey of that town, was not only the most efficient apparatus for disinfection by dry heat with which he had met, but that it was thoroughly successful to that end. The difficulty in securing a thorough penetration of heat into the interior of articles such as bedding, etc., to which Dr. Beveridge had referred, had been completely overcome; and not only could this be secured, but it was obtained at the smallest possible cost; because on account of the automatic action of the stove, not one farthing's-worth more gas was expended as fuel, than was necessary to maintain the interior of the stove at the required temperature, and by reason of the same action, the cost of a skilled superintendent was avoided. Thus in many towns the stove was filled at night with bedding and clothing, which included costly articles such as silks, crape, furs, sealskins, etc., and it was then left in action until the following morning without any supervision whatever, and without risk; it being known that during the whole period, the temperature at which the regulator had been set, and which as a rule varied from 248° F. to 258° F., had been maintained in every part of the stove.—Dr. W. OGLE (London) also testified to the efficiency of Dr. Ransome's stove, alleging that where articles had been dealt with in it, no second case of infection had ever come under his notice, and that the statement to the effect that the temperature necessary to disinfect woollen articles of clothing would also spoil them, was not borne out by his use of this stove. There were stoves and stoves. Mr. B. BALDING (Royston) bore similar testimony as the result of his personal experience.—Dr. HENRI HEUROT (Rheims) described and exhibited a filter which could be placed over the mouth and nares, and which would enable the physician to remain for any length of time in the immediate presence of infectious patients, without risk.—Dr. TRIPE (London) referring to the two small-pox hospitals within the district for which he was Medical Officer of Health, stated that the mortality from small-pox in the streets in the neighbourhood of the hospitals, amounted to 4.1 per 1,000, whilst amongst the remaining population it was only 0.21 per 1,000, and he considered that the disease spread from the hospitals, and this by other means than the air. As regards the fever hospital, scarlet fever and enteric fever were not more rife round the hospital when it was in use than in other parts of the district.—Dr. GRIMSHAW (Dublin) supplemented Dr. Stopford Taylor's paper by shewing that the small-pox epidemic of 1871-2 in Dublin had its origin in Liverpool, and referred to another instance of the importation of small-pox from Brooklyn, *via* Liverpool. He also strongly insisted on the importance of securing a system of compulsory notification of infectious diseases to the Local Sanitary Authorities.—Dr. DUDFIELD (London) laid special stress on the necessity of a general system for the notification of infectious diseases, in order to enable Sanitary Authorities to prevent the spread of infection by isolation and otherwise. He had hoped that the Section would have passed a general resolution expressing their opinion on this subject, but having been informed that there were reasons which rendered it undesirable that any general resolution should be passed, he trusted that the obvious unanimity which had prevailed on the subject might have the same weight as any resolution could have had.

On the Prevention of Syphilis.

By Dr. CUNHA BELLEM, Lisbon, Member of the Royal Academy of Science.

Conclusions:—1. The propagation of syphilis must be met by the propagation of the principles of morality and of the conscience; the promptings of lust, by the most careful and vigorous hygienic counsels; but the tyranny of syphilis can only be counteracted by the tyranny of inspection. 2. If every one can demand as a right that, even as the result of imprudence, he shall not contract syphilis, then no one can have the right to transmit it to others. 3. Therefore no one should be free to contract this malady, or to maintain it in his own person, for everyone should be free from the risk of contagion. 4. In order to guarantee this liberty, there is no other resource than the inspection of all persons suspected of having syphilis. 5. By acting on these principles syphilis will in the end be got rid of, or it will at least be banished into the sanctuary of married life, where it cannot be subjected to any controlling influence, but from whence feelings of morality alone will suffice to eradicate it.

On the Prevention of Venereal Disease.

By ALBERT L. GIHON, A.M., M.D., Medical Director, United States Navy.

Increasing popular interest in preventive medicine. Recognition of the responsibilities of the State, in connection with it. The large proportion of preventible maladies due to enthetic diseases. The danger to the innocent and helpless members of the community from diseases of this character. The duty of sanitarians to society respecting them. Insufficiency of statistics for giving a correct idea of the prevalence of these diseases, except in the cases of the naval, military and merchant services. The real evidence of their frequency among the better classes to be found only in the professsonal experience of practitioners of medicine. The State Medicine Section has properly considered the prevention of venereal disease one of the sanitary problems of the day. The solution of this problem heretofore hindered by the efforts of those who have stigmatized it as an attempt to legalize and foster prostitution. The safety of marriage and the protection of innocent women and children the real objects of this prevention. Any method of registration and compulsory examination of public women inadequate by itself to prevent the spread of venereal disease. The plan professed by the American Public Health Association, to constitute it a criminal offence to communicate a contagious disease, such as small-pox, scarlet fever, or a venereal disease. Practical difficulties in the way of this plan. These not insuperable. The zealous co-operation of physicians, as sanitary officers, only necessary.

Abstract of Paper on the Measures by which to Prevent the Diffusion of Syphilis.

By HENRY LEE, F.R.C.S., London.

1. Syphilis as affected by hereditary transmission. 2. Syphilisation—so-called and real. 3. Operation of the Contagious Diseases Acts in England and Paris. 4. Treatment. 5. Hospital accommodation. 6. Sobriety and cleanliness.

The Regulation of Prostitution in Vienna (Austria), and Syphilis.

By C. R. DRYSDALE, M.D., London.

There has been much debate in England for some years past on the question of the regulation of prostitution. Syphilis, that sad disease, is still too well-known to us. In the International Congress of Medicine of 1875, in Brussels, M. Vleminckx said:—'I notice one thing, and that is, the tendency which England has rather to abolish the visitation of prostitutes than to add to them. This is a great danger for the Continent. We might accuse you English of being the importers of syphilis.' Is it true that there exists more syphilis in this country than on the Continent? Let us examine facts. M. Jeannel (*Sur la Prostitution*, Paris, 1874) says:—'England surpasses us, the French, greatly in its institutions for diminishing the miseries and repressing the scandals of prostitution, as also in restraining the propagation of venereal diseases. With us, the *bureaux des mœurs*, the venereal hospitals, and dispensaries, of which, too, we were the commencers, are abandoned to the most complete anarchy, etc.' At Paris, the ninth part only of the prostitutes can be brought under police registration—50,000 cases of venereal disease are there calculated to be seen every year; and, of 40,000 prostitutes, 36,000 are clandestine. Even M. Vleminckx père, in 1875, at the Congress, whilst he boasted of Brussels as 'the purest of all

cities, as far as public morality was concerned,' admitted for Belgium that there was 'a black spot there which could not be got rid of—clandestine prostitution.' True syphilis, in our time, is much more common in Paris and other continental towns than formerly, notwithstanding regulations. Here (Mauriac, *Rareté Actuelle du Chancre Simple*, Paris, 1876) is what was each year the number of cases of true syphilis, primary and secondary, at the Hôpital du Midi since 1861. In 1861, 570; in 1862, 572; in 1863, 503; in 1864, 840; 1865, 849; 1866, 799; 1867, 893; 1868, 985; 1869, 1,442; 1870, ?; 1871?; 1872, 1,265; 1874, 1,578; 1875, 1,554. Compare the figures of 1861 (570) with those of 1875 (1,554). At Vienna (Austria), M. Sigmund said, at the Congress of 1875 (Brussels), 'We have visitations which are not very regular; but the police does its duty in a pretty regular way.' And yet M. Kraus, of Vienna, at the Amsterdam Congress, 1879, showed that there had been a progressive augmentation in the number of cases of venereal disease at Vienna, in the hospitals between the years 1850 and 1875. From his statistics it seems that the total of so-called 'syphilitic' cases treated in the General, Wieden, and Rudolphe hospitals, which reached 3,087 in 1867, were 4,549 in 1875. The General hospital, in 1850, treated 2,078 cases; and in 1864, 2,189. Wieden, in 1850, had 354 cases; and in 1864, 2,030. 'A glance at these statistics,' says M. Kraus, 'shows us an augmentation of syphilitic affections in the three large hospitals. We may say that, with the greatest probability, practitioners in private equally remark in their patients a proportional augmentation in the number of patients affected with syphilis.' Now, where no regulations exist, as at present, in London, but where prostitutes, as is actually the case here, are admitted easily into the workhouse infirmaries, there exists, I believe, truly less syphilis than in those towns, as Paris, etc., where the prostitutes fear being put in prison in case they are diseased. Even at Brussels there exists, according to M. Thiry, a large number of cases of syphilis. My personal experience in London, then, leads me to urge for the diminution of syphilis, the easy admission of patients into hospital, and the abolition of the French system, which causes clandestinity.

The debate on the subject of these papers then took place.—Dr. C. M. GIERSING (Copenhagen) stated that the Contagious Diseases and allied Acts were founded on the impression that it was possible to say whether or not a woman had a venereal affection, and as such was a public danger. But he considered that it was at times most difficult to discover venereal affections; that women, without local signs of syphilis, were capable of communicating the disease; and that many women quit the dispensaries whilst still a danger to the public. How, also, was it possible to control syphilis by detaining women, when syphilitic men were free to syphilise any number of women? He believed that if it had been thoroughly understood that the effort to restrain the spread of syphilis was to be limited to action towards women, whereas, on the other hand, men were to be freed from some of the risks attaching to vice, such laws would never have come into operation either in England or Denmark.—Dr. LADAME (of Neuchatel) pointed out that it was intended to extirpate venereal diseases by tolerating the regulation of prostitution, without seeing how opposed to each other these two courses were. Prostitution is the house of syphilis, and through it syphilis is spread. Every one knew, also, how syphilis daily found its way into licensed houses notwithstanding the efforts of police and physicians. In his opinion the only prophylactic measures which could be efficacious towards the prevention of the spread of this disease, were those which attacked its root and origin, namely, prostitution; and the only intervention of the State which was needed was to protect the public from the solicitations of public women, in the same way as we were protected from those unfortunate people who followed us to beg for bread.—Dr. WILLIAM CARTER (Liverpool) maintained that the attempt to supply healthy prostitutes increased the demand for such women; he showed the failure of legislation to control syphilis in Brussels and Paris, and quoted statements which indicated how State interference in the matter led to clandestine prostitution.—Dr. H. SCHOENFELD (Brussels) desired to see the scope of the Contagious Diseases Acts enlarged by making it compulsory on every man who frequented a licensed house first to submit himself to examination.—Dr. BELL TAYLOR (Nottingham) maintained that the Contagious Diseases Acts were not only ineffectual, but quite unnecessary; that the vast majority of men who contracted disease suffered from gonorrhœa only; and that many of the sores contracted were non-syphilitic, whereas true syphilis was easy of cure. True syphilis, he maintained, had increased in the army under the influence of the Acts; and these latter were in the end bound to fail, for reasons which were given in detail.—Dr. NEVINS (Liverpool) produced evidence to show that hereditary syphilis was almost unknown amongst the working-classes in the manufacturing districts, that the amount of venereal disease in the mercantile marine of Liverpool was very trivial; and that since strict periodical examination of women had been in operation secondary syphilis and gonorrhœa had increased.—Dr. B. KRAUS (Vienna) looked upon syphilis as being mainly spread by means of prostitution, whether open or clandestine. Its spread by means of public prostitution could, he believed, be effectually controlled provided all prostitutes were compelled to ply their trade in licensed brothels. As regards clandestine prostitution, no remedy would be satisfactory short of an enforced examination of the working-classes, through whom the disease was mainly spread; and a series of propositions was laid down as to the periodical examination of artisans in factories, and domestic servants, both male and female, these examinations to be followed by the issue, free of cost, of a certificate of health. In this way only could persons be saved from the risk of syphilis being conveyed to their children by nurses, and to themselves and their families by means of infected food, etc. The remedy, he admitted, was a severe one, but it was the only efficacious one; and he trusted the Congress would bring the subject under the notice of the Government.—Professor G. VAN OVERBECK DE MEIJER (Utrecht) considered that the action which should be taken with regard to syphilis was that which we took in controlling other contagious diseases, namely, to seek out and deal with those who were infected; and if hitherto we have failed, it is because our measures are not properly organised, and some more efficient organisation than state inspection should be sought out. The infliction of punishment in the matter is a fundamental error; for it is not only impossible to find out the culpable, but the more public prostitution is crushed, the greater is the increase in clandestine prostitution. The police should endeavour to abolish private houses of vice, and whilst to a certain extent sanctioning licensed houses, they should do all they can to prevent their inmates from spreading disease.—Dr. L. LE GROSZ DE CSATAR (Buda-Pesth) advocated the confining of prostitutes absolutely to licensed houses, as the most effectual method of staying the spread of syphilis.—Dr. ROUTH (London) quoted statistics to show that towns under the Contagious Diseases Acts suffered more from syphilis than others which were under no such control. In the former a supposed security against infection led to an increase of disease, and hence it was useless to adopt places of so called prevention which elsewhere had resulted in failure.—Dr. ELDER maintained that great obstacles stood in the way of restrictive measures, these obstacles including the impossibility of ascertaining that a patient was incapable of conveying infection. Both syphilis and gonorrhœa were communicated when both diseases were unrecognisable in the women communicating them.

ON THE PRECAUTIONS NECESSARY TO PREVENT THE DIFFUSION OF HYDROPHOBIA.

By Dr. H. VAN CAPELLE, The Hague.

1. The prevention of rabies involves the prevention of hydrophobia. 2. In 1873-74 the cases of rabies became so numerous in the Netherlands that the Government resolved to present to the Chambers of the States-General a Bill for dealing with this disease. 3. The measures proposed by this Bill rested on the doctrine—ably maintained in an

article in the *Encyclopædic Dictionary of the Medical Sciences* by M. Bouley—that rabies is essentially a contagious disease. 4. The principal measures of the Bill, which was passed and became law on the 5th of June 1875, were as follows:—*a*. The slaughter of every dog or cat which was either mad or had been bitten by a mad animal. *b*. The use of the muzzle for a period of four months for all dogs in any commune in which a case of rabies had come under notice, whenever they were in a public place. The same regulation to be in force in the adjoining communes, or in a part or the whole of the province, when there were grounds for believing that a mad dog had been seen there. *c*. The slaughter of all dogs found in public places without a muzzle, during the period for which use of the muzzle had been ordered. *d*. All proprietors of dogs to kill, shut up, or chain up, if possible, any mad dog they own; the facts to be immediately communicated to the *bourgmestre* or to the superintendent of police. *e*. All suspicious cases to be examined into by a veterinary surgeon. 5. The law came into operation on the 1st of September 1875. During the last four months of that year 41 cases of canine madness occurred in 36 communes; being distributed in all parts of the country, but occurring mostly in the provinces of northern and southern Holland, with their large towns, and in the provinces bordering on Belgium. A rapid diminution of vagrant dogs took place. In the twelve months of 1876, 55 cases of canine madness in 49 communes; 9 of the cases only being in the provinces of northern and southern Holland; the majority being concentrated on the borders of Belgium. In 1877 only 14 cases, all in the communes bordering on the Belgian and Prussian frontiers. In 1878, 4 cases, all near the frontier. In 1879, 7 cases, 3 occurring in the centre of the country. One of the latter cases occurred in a sporting dog recently imported from England. A second case was that of an ownerless dog, which had fled from Rotterdam to Kralingen, and as no cases had been previously observed in Rotterdam for several years, the dog had probably escaped from some ship in port. No information as to the third case. In 1880, 13 cases, all near the Belgian frontier. 6. These results prove the efficacy of the law of 1875, and the need for international measures; also the possibility of stamping out rabies in Europe and all civilised countries. 7. It is proposed that the Congress should declare it desirable that the Governments of all civilised countries should agree as to measures for the abolition of rabies, which disease, as shown by the results obtained in the Netherlands, is exclusively of a contagious nature.

THE DOG DISEASE, OR CANINE MADNESS OF THE ARCTIC REGIONS, VIEWED IN CONNECTION WITH HYDROPHOBIA, TOGETHER WITH THE MEASURES USED AND SUGGESTED FOR ITS EXTINCTION, FROM INFORMATION COLLECTED, AND OBSERVATIONS MADE IN THE COUNTRY.

By THOMAS COLAN, M.D., Deputy Inspector-General of Hospitals and Fleets; Fleet-Surgeon in the late Arctic Expedition.

The Greenland or Esquimaux dogs are more like wolves than dogs, indeed they are supposed to be domesticated wolves. They are the 'Horses' of the Esquimaux, without which the latter could scarcely live; they are capable of enduring great cold and much deprivation of food. These animals travel long distances, and carry heavy weights. Now these dogs are subject to a kind of madness, much resembling rabies, though differing from it in some marked particulars. The disease broke out about the year 1859, and spread over nearly the whole of the Inspectorate of North Greenland. It appeared all the year round, especially so in spring; it was violently contagious between dog and dog, and was also supposed to be so between the dog and fox; foxes having been thought to have communicated it to the dog, as they have been seen affected with the complaint. The virus is supposed to reside in the saliva, which flows from the mouth and nostrils, and this can be propagated by means of deglutition, absorption through the skin, and by inoculation through a bite or otherwise. As far as I could ascertain, no human being was affected with true hydrophobia from the bite of the dog, though the natives have a great horror of being bitten, notwithstanding they sometimes use the skin, and even eat the carcase of infected animals occasionally. The disease caused much havoc amongst the dogs for several years. Medicine seemed to be of little avail in the treatment, and at length the Danish Government found it necessary to issue directions in the Danish and Esquimaux languages, how to deal with the disease, which in reality amounted to 'stamping out', and thorough disinfection of harness, feeding utensils, sledges, and even the ground on which the dogs had lain, by chloride of lime, and carbolic acid; the carcases were to be taken out and buried at sea, or burnt. Separation of the infected dog, and excision or cauterisation of the diseased part might be useful, but if many dogs were affected, the whole pack may be destroyed. The disease gradually declined in extent and virulence. It may have been a form or modification of this sickness which attacked the dogs in Dr. Hayes' expedition to Smith's Sound in 1866-67, and those also in the 'Alert' and 'Discovery' in Captain (now Sir George) Nares' expedition in 1875-76, further north into the great frozen sea. Doctors Kayne, Hayes, and Ninnis state, that they each had a case of true hydrophobia in the dog. From observation and post-mortem examination no reliable cause was found for the complaint, but in all cases examined the autopsy revealed a 'pitchy' substance in the intestines, and ulceration for four inches on either side of the ileo-cæcal valve. Symptoms were, on the whole, much the same as in the dogs further south, but there was some difference as to length of attack, etc. Medical treatment in the English Expedition appeared to have some effect; but 'stamping out' was, in some cases, adopted, and it may be necessary in the future to resort to such again. Is it not possible that the dog disease of the Arctic regions is but ripening rabies, which to the southward of 70° north shows itself in the rabies which causes hydrophobia? Or is it that hydrophobia is modified in passing through the bodies of carnivorous animals going north, such as foxes and wolves, and becomes the disease we see in North Greenland? It is worthy of note, that when rabies first appeared in some countries it was less virulent than after a number of years: if so, might it not now be ripening in Greenland? At all events, we must try to prevent its spread; the fact that some persons bitten by rabid dogs suffered no evil effects is no proof of its not being rabies, for many persons bitten in more southern latitudes by mad dogs have escaped.

(To be continued.)

SPECIAL REPORTS.

YORKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE Meeting of the members of the above Association was held on the 26th ult. Dr. Butterfield, of Bradford, presided.

Dr. J. Mitchell Wilson, of Doncaster, the secretary, read a record of the proceedings at the last meeting.

THE INFLUENCE OF IMPROVED DRAINAGE IN THE DEATH-RATE OF A DISTRICT.

Dr. T. BRITTON, Halifax, read a paper giving 'an Illustration of the Influence of Improved Drainage in the Death-rate of a District'. He said:—The district which I have selected to illustrate my subject is that of the Hipperholme Local Sanitary District, which comprises the villages of Hipperholme and Lightcliffe, and part of Bailiff Bridge. It is situated on the hill-side facing the south, and has the Lancashire and Yorkshire Railway running through it. The subsoil of the upper part of the district is clay, and that of the lower part millstone grit. It is only lately that stone has been found in sufficient quantity to pay for quarrying, but more extensive quarries have been opened out, and much stone is procured. It has two commodious stations on the railway, viz., Lightcliffe and Hipperholme,

which are about a mile apart, and with a constant service of trains, which add much to the convenience of the inhabitants. It contains many gentlemen's residences, and was a favourite place with the late Sir Titus Salt, whose residence, 'Crow's Nest', is situated therein. On account of the healthy character of the neighbourhood, it has been selected as a place of residence of families who were considered of somewhat delicate constitutions; and many families from Bradford and Halifax went to live there on that account. Many consumptives were sent out there, who contributed to heighten the death-rate. During the last few years, land has been sold more freely for building purposes; and many smaller houses have been built. This will enable people with small incomes to avail themselves of the advantages of this salubrious neighbourhood. When I became Medical Officer of Health, in 1873, the death-rate was high, and continued so for three years. During that period steps were taken to obtain a complete system of drainage. The drainage of the district was of the usual style of the country places in this neighbourhood, viz., common rubble or stone drains, made without mortar, and allowing soakage into the subsoil. The water-supply was from the mains of the Halifax Corporation, and was therefore all that could be desired. Zymotic diseases ranged from 2 to 3.9 per 1000 per annum. In my report for 1876 I say 'I am sorry to have to record that the main drainage scheme, which is so urgently needed in this district, should have been so much retarded. The application to the Local Government Board for money to carry it out with, was refused; and fresh plans have to be provided'. In that year the death-rate was 23.9. In 1877 the new scheme was commenced, and in my report for that year I say, 'A large part of the new drainage scheme is already carried out, and the remainder is in progress. The death-rate then dropped to 18.1. In the following year, 1878, the schemes were completed, and the death-rate fell to 12 per 1000. In 1879, you will see that the death-rate rose very much, viz., to 22.5. This, however, was accounted for by the fact that the district was visited by three epidemics of zymotic diseases, viz., scarlatina, which caused six deaths; measles, which caused two deaths; and whooping-cough, which caused four deaths. Diseases of the lungs were also extremely prevalent, and carried off many, especially aged people, sixteen of whom died at the age of 60 and upwards. This was due to the cold and damp weather which prevailed during the year. The next year, 1880, it again fell to 16 per 1000. The average rate for the three years prior to the drainage scheme was 24.9, and, for the three years after the scheme was finished, was 16.8, or a fall of no less than one-third. This is in spite of the serious epidemics in 1879, when the zymotic rate was 5.6 per 1000. That this decrease in the death-rate was not due to a decrease in the birth-rate is shown by the fact that 317.7 per 1000 deaths died under five years of age, against 299.1 in the three preceding years. A careful study of all the causes likely to produce this satisfactory state of things, has pointed mainly to the improvement in the drainage. Of course, careful sanitary supervision has contributed partly to this result. If not to the improved drainage, to what am I to ascribe this decided improvement in the death-rate? I need scarcely say, that now I consider this district one of the most salubrious in the West Riding, and from that fact, and from its admirable railway facilities, it is eminently suited to the wants of large numbers of persons whose businesses are in Bradford or Halifax. It has for many years been recommended by the medical profession in these towns as a desirable residence for people of weakly constitutions; but now, more than ever, it deserves this reputation.

In answer to Dr. Wilson, Dr. Britton said the deaths from phthisis have been high all along, but not quite so high since the drainage scheme had been carried out. In answer to Dr. Jackson, of Denholme, Dr. Britton said the population had not decreased, but steadily increased. The death-rate for 1881, for the half-year, was about 12.2 or 12.3.

Dr. HIME, Sheffield, said, from the information given them by Dr. Britton, he should think the death-rate was rather high for such a district, and he should scarcely feel justified in arriving at the same conclusion as he did. But probably he knew all the circumstances of the case, and they had scarcely all the facts before them. For two years the death-rate did not happen to be remarkably low, but rather above what they might expect from a district of a semi-rural character, inhabited by the better class. The zymotic rate throughout was large—2.7 was a high figure for a population of that character. 2.5, even 1, was high enough for a town-rate, but for a suburban or rural rate, he thought it indicated that something was wrong. Out of nine years there were only three when it fell below 2.0. Dr. Britton made reference to the influence of the birth-rate upon the death-rate. His argument was that a high birth-rate caused a high death-rate. He (Dr. Hime) thought it would be an unfortunate thing for this country, if a high birth-rate should always mean a high death-rate. It did sometimes happen; but he doubted whether it could be stated as a general fact. If Dr. Britton would be good enough to give some little details with regard to the character of the diseases prevalent in this district, it would be better, because if they only had the totals they might arrive at false conclusions. As to what could be done by sanitary authorities in diminishing diseases of a zymotic character, various opinions seem to be entertained; but he thought they would all consider that hospitals for infectious diseases were important things to be provided, not only as giving a means of safety to the patients themselves, but to prevent the disease affecting their neighbours.

Dr. WILSON thought the subject Dr. Britton had brought before them exceedingly interesting. It was one of those questions whether the expenditure in sanitary works undertaken by the authorities was having the desired effect. In addition to the question of drainage, he should like to know in what way the house connections were made with the drains, as sometimes the houses were worse off after they had been connected than they were before, by bringing deleterious gases to the houses, through bad workmanship. He wished to ask whether the cases of scarlatina were of the malignant type, or whether the deaths were chiefly from dropsy. Also what was the proportion of deaths from that disease in regard to the cases. They knew there were cases where children died from whooping-cough and other diseases, notwithstanding the best sanitary arrangements and the best medical attendance. He thought those cases were often caused by neglect at home. He wished to know what was the proportion of births to deaths under one year. Under all the circumstances, he thought a few years was not long enough on which to arrive at a conclusion. The more they had to do with statistics, the more they saw the necessity for their calculations being based on a long period of time. He hoped Dr. Britton's conclusion would be borne out by the future history of that particular district.

The CHAIRMAN said, Dr. Britton had put before them in a clear manner the effect the sanitary authorities might expect in improving the sanitary condition of a district. It was a very common thing for members of Local Boards to argue in a *cui bono* manner. It was exceedingly satisfactory when they were occasionally able to show they had a good result for their outlay. He had no doubt that improved sanitary conditions must ultimately improve the health of a district, and lower the death-rate. He did not attach much importance to the death-rate *per se*, especially in districts with a small population. It was well known that four or five deaths in a small population might make a difference in the death-rate, but they might have nothing to do with the sanitary condition. He should like to know whether tubercular diseases, phthisis, or scrofula had been diminished in a larger proportion than the general death-rate from other diseases.

Dr. BRITTON said there was only a small proportion of deaths of children under five years of age. The high death-rate was in a great measure due to the fact that the deaths, principally in that district, had been those of people who were older, because many people of debilitated constitutions had come into the district at various times; and they had tended to increase the death-rate. Therefore the death-rate was not so much increased by the deaths of children as by adults. The zymotic diseases in 1879 were not confined to the Hipperholme district. They had

throughout the West Riding an epidemic of scarlatina, measles, etc., and he did not think they could be laid against the district. As regards a high birth-rate causing a high death-rate, he could only say he had found that the rule in a district such as his. The fact was there was a large number of unhealthy children born, and they had a large number of premature births, and children died of marasmus early. These children dying off so early naturally increased the birth-rate and the death-rate. Dr. Hime said that with a rural district he should hardly have expected such a high death-rate. Although a rural district, most of the people worked in mills; therefore they were placed under the same unfavourable conditions as those in towns. Although a rural district, it had an urban population. With regard to the drain connections, he must say they had been fairly well done; and faulty connections had been extremely few. With regard to the character of the scarlatina, it was not severe, and there were only six deaths. With regard to the number of years required in order to form a fair estimate, he had to deal with the material he had at hand. Prior to the time he became medical officer no records of that character were kept, so that he had taken the first three years and the last three years; and the result seemed to him to be remarkable, especially when they considered the high zymotic death-rate in 1879. The population was about 3,000, and the area somewhere about 900 acres. Tubercular diseases had decidedly decreased since the drainage scheme was carried out; and he thought they might fairly ascribe it to the carrying out of that scheme.

Dr. HIME wished to explain that he had attempted to show, that they had scarcely the figures before them to indicate the exact nature of the case, and not that the death-rate was not improved, for everyone knew that good drainage was as necessary as good food. He did not suppose for a moment that a man with a dirty midden was likely to generate scarlet fever; but the general health condition was lowered, and a man would be less liable to resist the the attacks of disease. Throughout the whole of England, during the last twenty-five years, there had been a marked improvement in the sanitary condition of the country by the works which had been carried out. Dr. Britton, and men like him, deserved the greatest credit for what they had done, and he had no doubt they would live to reap the great benefit from such works. He moved a vote of thanks to Dr. Britton for his valuable paper.

THE TRICHINA SPIRALIS IN PORK.

Dr. J. MITCHELL WILSON read a paper on 'The Trichina Spiralis.' He said that until recently this subject was one in which curiosity formed the largest share of any interest it might have excited amongst medical men. The rarity of the disease, caused by the presence of the parasite in the human subject, in this country afforded and yet affords few opportunities of studying the history and progress of any outbreak of trichiniasis. The outbreak of what was at first supposed to be enteric fever, on board the *Cornwall* training ship, lent importance to the whole subject. These parasites belonged to the order nematoid, or round worms, and in the sexually mature state the female measured nearly one-eighth of an inch in length, the male about half that size, while in the larval or intestinal stage of existence the worm, at the largest, only measured one thirty-fifth of an inch. The body is rounded and thickened behind, with a narrow finely-pointed head and centrally-situated mouth. It was only in 1835 that the trichina spiralis was first observed in this country; and its life history is now clearly made out. Within two days after infected pork is eaten, the gastric juice having dissolved the walls of the cyst containing the worm, it then attains its sexually mature condition. In the female, the number of young has been estimated at from 10,000 to 15,000. In two or three weeks this enormous number of parasites is produced, and immediately begins its wanderings towards the muscular structures of the body. It is yet unsettled whether these journeys are by means of perforation of the bowel into the sub-mucous tissue, or into the peritoneal cavity and the muscles, or by the circulation. The chief objection to the latter method is that emboli rarely present themselves in the fatal cases, which they might expect to be of frequent occurrence if large masses of parasites gained admittance into the blood circulation. It was, however, in the cystic stage that the trichina was most commonly found, and its appearance at that stage had the greatest interest to medical officers, when examining suspected pork. On reaching the muscles the worm was gradually enclosed in a cyst formed out of the surrounding fluid, and those cysts were found between the bundles composing the muscular layers. In the course of a few months the cyst got hard from the deposition of calcareous matter, which gave the meat an appearance as if peppered. If the disease caused in pigs by the trichina was as common as reported, it became a very urgent duty to carefully examine the meat imported; for if looked at, either from the enormous quantity of pork imported, said by Mr. Mundella to be 5¼ million cwts. annually, or from the serious and incurable disease set up in man by the use of such infected food, the subject was one possessing peculiar interest for those whose first maxim was 'prevention is better than cure.' He obtained about twenty pieces of pork, from different parts of his district, but after examining them carefully he failed to detect any signs of the trichina, but through the kindness of Dr. Butterfield, he had been able to obtain from a piece of ham a few specimens, which would exhibit the destructive character of the parasite fairly well. In Germany, in recent years, a microscopical examination of the pork had been made compulsory, and since that work had been instituted, the disease had been found less frequently. It was in Germany they read of the most serious of the epidemics of trichiniasis in recent years, and these had been very much due to the practice of indulging in pork very imperfectly cooked. In 1865, 350 persons were attacked at Hedersleben after eating some portions of a pig. One hundred persons died, and the trichinæ were discovered on making a *post-mortem* examination. After a reference to several cases of supposed fever which occurred in a family in Cumberland, and which subsequent inquiries showed had been caused by eating trichina-infected pork, he said Professor Cobbold calculated that every ounce of the pork contained 85,000 of the trichinæ; and that in three weeks after eating that amount, a person would have 42,000,000 of these parasites in his muscles. Dr. Wilson referred to the points in which the similarity to or differences from cases of enteric fever were brought out, particularly noticing Mr. Power's recent report of the outbreak on board the *Cornwall* training ship. He concluded by stating that a new field for investigation had been opened out, which would probably induce many in the future to very carefully examine that particular part of our food supply which was supposed to be fraught with so many dangers arising from the trichina spiralis and allied parasites.

The CHAIRMAN said he made the discovery of trichinæ in an American ham. He did not know whether his case was the only authentic one mentioned in the House of Commons by Mr. Dodson. He sent up a report of it to Dr. Buchanan. He had specimens, not only of American ham, but of English and Irish ham, purchased at twenty-four different places. He examined nine cases with Mr. Rimmington, of Bradford, and they did not find any. In the tenth, he found a trichina spiralis. He had brought with him a portion of the ham, and they would see, after they examined it, there was nothing special in the appearance of the ham to distinguish it from ham that was perfectly healthy. At any rate he could not distinguish it himself; and he was certain no person buying it would know it was diseased. When he found the trichina, he went to the shop, where the specimen was bought, and seized the whole ham. He had no doubt several people must have eaten portions of it; but so far as he knew, no evil results had occurred. The ham was American, and sold at 6½ per lb., taking the piece. He subsequently examined twenty-four pieces of other hams, but could find no trichinæ. He would not conclude that because he failed to find them they did not exist. There could not be a very large proportion of trichinosed ham from America, or they would hear more of it. It was right they should guard against that sort of thing, because in a town like Bradford they would consume

500 or 600 hams *per diem*; and it would be impossible to examine the whole to find trichinæ.

Dr. BRITTON said he had often seen cases where it was difficult to say whether it was enteric fever or not. Under those circumstances it might be possible that some of those cases might arise from eating pork containing trichinæ. There was one thing, the public could guard themselves by thoroughly cooking the meat. The reason why it did not prevail here as in Germany was because they were in the habit of more thoroughly cooking their food.

Dr. HIME pointed out that it was impossible for trichinæ to occur in fish.

A vote of thanks was passed to Dr. Wilson for his paper. He exhibited specimens of the trichina in pork in several stages by the aid of a microscope.

Dr. Wilson proposed the following medical officers as members:—Mr. W. Pogson, Seacroft; Mr. John W. Mason, M.D., Hull; Mr. T. E. Atkinson, Craven; Mr. M. T. Sadler, M.D., Barnsley; and Mr. A. Barker, Aysgarth.

REPORTS OF MEDICAL OFFICERS TO THE LOCAL GOVERNMENT BOARD.

DR. BLAXALL reports on the sanitary condition of Ilkestone and the prevalence of enteric fever in the district. It appears that Dr. Buchanan inspected the same town in 1870 in consequence of the prevalence of scarlatina and enteric fever, when certain recommendations for the improvement of the sewerage, etc., were made, but have not been all carried out. Enteric fever has been again prevalent since June 1879, and during 1880 as many as 105 cases occurred out of a population estimated at 12,600 (14,119 at census 1881). The public water-supply is derived from three sources, two of which are not satisfactory, and only about half of the houses are supplied by these; the remainder obtaining their water from wells and rain-water tanks, both of which are placed in polluted soil. The excrement pits are great nuisances, being three, four, or more feet below the surface, not watertight, and rarely emptied. Many are uncovered, and give off offensive smells. The sewerage is defective, the sewers being badly constructed, the house-sinks connected directly with the sewers, and trapped only with bell-traps. The cases occurred chiefly in the line of certain sewers, and the infected houses were all provided with midden privies. In one area there were 250 houses, of which as many as 47 were invaded by the disease. Dr. Blaxall attributes the last mentioned outbreak to the infected air of the sewers escaping into the houses. He makes certain recommendations which the Local Government Board should enforce.

Dr. BALLARD contributes an interesting report on an epidemic of scarlatina in Halifax, which was partly caused by infected milk. The disease began early in November 1880, and 37 cases were reported between that date and the 25th of December. A sudden extension of the disease occurred on the 29th of December and increased rapidly for a few days, and quickly subsided after the end of January. On enquiry, it was found that out of 135 families supplied by one milkman 53 were attacked, 72 escaped invasion, and as regards ten the facts could not be ascertained. Amongst the 72 families which escaped, they were, with fourteen exceptions, either households without children, or in which the children had had scarlatina before. On visiting the farm, it was found that the man who milked the cows had slept with five children who were attacked with the disease on the 31st of December and the early part of January. He was also very dirty in his habits. Dr. Ballard attributed this last outbreak to the milk, but considered that the other cases were spread in the usual way, and that the disease had not been held in check by isolation of the sick, and disinfection of their clothing and bedding as it ought to have been.

In consequence of an outbreak of diphtheria at Llanwddyn in 1880, Dr. PARSONS enquired not only into the sanitary condition of this village, but also of the Llanfyllin Registration District. He found many of the smaller houses damp and dirty, the garrets unceiled, with low sloping roofs, and very imperfect ventilation. T house drainage was bad, and privies were in c Some of the houses in which diphtheria occurred and ill-ventilated, but in others the sanitary co good. Defects of drainage and water-supply c to have been concerned in the production of Dr. Parsons makes several suggestions for im sanitary condition of the district.

Dr. PARSONS also reports on the sanitary c Walton-on-the-Naze, which is a small watering- frequented in summer. He says that the wat bad, being little else than diluted brine, cont grains of common salt per gallon; consequentl water is brought to the town by carts and s bucketful, or is obtained from shallow wells. sewered in 1870, but the sewer in High Stree fall, and empties itself into a reservoir furnished stock which is opened by hand, and often le backing of sewer air up the sewers. The sculle not cut off from the sewers, and are merely pro bell-trap; and the water-closet accommodation is and badly supplied with water. There were fo enteric fever in 1880 and one death. The occurred at an hotel, and the disease spread t house. The house drains where these and cases occurred were in bad order and condition.

AWARDS, PARKES MUSEUM II NATIONAL EXHIBITION

THE following are the complete lists in the concerning which our readers are likely to interested :—

SECTION XIII.—DOMESTIC AND HOSPITAL AR TURE: PLANNING, CONSTRUCTION, AN DECORATIVE MATERIALS.

Judges.—Sir Joseph Fayrer, F.R.S.; George A A.R.A.; Fred. J. Mouat, M.D.; Edward C. F.S.A., F.R.I.B.A.; P. Gordon Smith, F.R Professor Thomas Roger Smith, F.R.I.B.A.; Hen Snell, F.R.I.B.A.; Alfred Waterhouse, A.R.A.

First Class.—Robert Adams, reversible windo adjustable door-springs; Henry Doulton & Co., a ware; Charles Drake & Co., marble concrete; Douglas Galton, C.B., hospital plans; Howard parquet flooring; Ihlee & Horn, Balmain's l paint; Russell and Erwin Manufacturing Compan and lock furniture; Mons. Tollet, hospital plans; W Co., architectural glazed ware; T. Worthington, F. hospital plans.

Award of Merit.—Albissima Paint Compa paint; Artisans, Labourers, and General Dwe Limited (Rowland Plumbe, architect), plans o for artisans and labourers; Lawrence Booth, F. plans for dwellings; M. Bordiau, plans for wa ventilation of public buildings; Bryden & S hanging apparatus; Candy & Co., damp-proof building and paving; Coe & Robinson, architec plans; J. Finch & Co., bisque glazed bricks building materials; Grantham, jun., & Denton, j for abattoirs; Hobbs, Hart, & Co., locks Maguire & Co., oxidised iron (Barff's proces Pritchett, F.S.A,, corrugated ventilating pipes, of construction; Silicate Paint Company, wa temper; Smith & Turner, door springs, water bolts; A. Smith & Stevens, sill bars and case spring hinges, door knobs, and locks; Spen Manufacturing Company, Spence's metal; Jam Sons, art stoneware vases, etc.; W. Tonks & and fanlight fasteners and openers, steel sash- chains, and other door furniture, and wedge case E. Turner, F.R.I.B.A., hospital plans; Fred & Co., wall decorations (Lincrusta-Walto Walker, concrete flooring; Wortley Fire Cla glazed bricks and other building materials; W & Co., non-arsenical wall and ceiling papers.

; exhibits in this section were not competition for awards, being wise officially connected with the exhibi-
. Judge, architect, plans of three-room tisans and labourers, drawing for fireplace
. V. Poore and A. Waterhouse, A.R.A., nstruction of University College Hospital;
bins, F.S.A., F.R.I.B.A., designs for hools; Prof. T. Roger Smith, F.R.I.B.A., tals; H. Saxon Snell, F.R.I.B.A., designs d parochial establishments.

IV.—VENTILATING, LIGHTING, AND WARMING.

H. Collins, F.R.I.B.A.; Captain Douglas R.S.; George Godwin, F.R.S., F.S.A.; I.R.C.S.; Professor Kerr, F.R.I.B.A.; .R.I.B.A.

– Benham & Sons, general excellence; & Son, general excellence; Chorlton & unlight' stove; T. J. Constantine, 'cook-ssley Bros., 'the Otto silent gas-engine'; hot-water apparatus; R. Renton Gibbs, ce; Robert H. Griffin, improved register Hopkinson, 'Libra lamp and valve'; S. eneral excellence; Longden & Co., 'the Musgrave & Co., general excellence; T. the Thermhydric' grate; G. E. Pritchett, ct, heating and ventilating apparatus; Company, 'Radiator cooking-range'; l, general excellence; C. R. Stevens, hot-; Strode & Co., general excellence; Verity iller', and for general excellence; T. Waller excellence; J. Weeks & Co., general ex-n Engineering Company, cooking ranges.

erit.—Robert Adams, ventilating window . Bacon & Co., general excellence; P. F.R C.S., ventilators; Frank W. Clark, Comyn, Ching, & Co., general excellence; line, warming apparatus; John Drysdale, . Hayward, system of natural ventilation; & Son, general excellence; J. E. Ellison, rs; Faraday & Son, gas appliances; J. origen; Gilmore & Clark, ventilators; r, water heaters; Harry Hunt, 'Crown . Kite & Co., chimney top; Charles Port-Tortoise' stove; Mrs. Priestley, window hie & Co., 'Lux Calor' apparatus; Sani- and Ventilating Co., general excellence; , general excellence; Steven Bros. & Co., ce; Thames Bank Iron Co., general ex-Tonks & Son, Currall's ventilators: the ilator.

-WATER-CLOSETS, SINKS, BATHS, ETC., SEWAGE AND DRAINAGE.

fessor W. H. Corfield, M.D.; Rogers .E.; William Eassie, C.E.; R. Thorne Ernest Turner, F.R.I.B.A.

Beard, Dent, & Hellyer, 'Artisan' water-ing rim and improved joint between basin closet, with flushing rim and ventilation to lead S and P Traps. Birmingham Sani-, Potts's Edinburgh air-chambered dis-. John Bolding & Sons, Simplex valve hing-rim and water supply to overflow; t waste and air vessel. H. Braithwaite & on water-waste preventer. W. P. Buchan, necting drain-trap. Joseph Cliff & Sons, ware sinks and baths. Henry Doulton & oint for drain-pipes; 'Kenon' air-chamber ocking water waste preventing bath fittings. valve-trap. A. Emanuel & Sons, syphon ite preventer, with after flush. J. Finch & sconnecting drain-trap; 'Royal' porcelain , Tyler, & Co., hopper-closet, with flush-ap, fitted with regulator and Chandler's cistern. Ingham & Sons, Stanford's joint George Jennings, automatic flushing jar, and 'Dubois' drawn lead traps. Walter Macfarlane & Co., excellence of iron-work. Moule's Patent Earth Closet Co., Moule's earth closet, No. 9. J. Parker, dry earth closet, self-acting without separator. J. Purnell & Son, hopper-closet with flushing rim. Shanks & Co., spray and douche baths. H. Sharp, Jones & Co., Stanford's joint for drain-pipes. Thomas Smith & Co., Herbert Jones's drain-pipe. J. Tylor & Sons, valve closet with flushing rim, and without overflow connected with valve box; flushing urinal trapped in basin; waste-not closet valve, locking water-waste preventing bath fittings. F. G. Underhay, regulator for valve closets.

Award of Merit.—A. T. Angell, air-tight covers for air chambers and inspection shafts. Beard, Dent, & Hellyer, disconnecting trap for soil-pipes; disconnecting gulley-trap, with side inlets for rain-water pipes and sink wastes; syphon action flushing cistern; 'Artisan' water-closet and slop-sink, combined; square enamelled iron slop-sink; lavatory basin, with quick waste. John Bolding & Sons, 'National' wash-out closet, with flushing rim; syphon-action water-waste preventer; 'Champion' trap. H. Braithwaite & Co., wash-out closet, with flushing rim; Claughton's trap. Edward Brooke & Sons, stoneware ribbed pipes for sewers. W. P. Buchan, drain pipes, with rest and access lid. Capper, Son, & Co., Brian Jones's patent joint. Henry Doulton & Co., Doulton's joint for drain pipes; stoneware grease trap; Latham's balance valve drain-flap; disconnecting gully-trap, with reversible top and side inlets; Lambeth flush out closet, with flushing rim; lipped urinal, with constant flow; 'vacuum' water-waste preventer. C. W. Durham, rigid construction of house drainage. A. Emanuel & Sons, chain-action water-waste preventer, with after-flush. Eureka Concrete Company, concrete sewers in segments. J. Finch & Co., porcelain sinks for butlers. Gillow & Co., lavatories for limited space. Hayward, Tyler, & Co., urinals, with treadle action; Chandler's water-waste preventer; shower and douche bath valves. Edward Howard, Saxon Snell's automatic flushing and ventilating arrangement for water-closets, etc. Ingham & Sons, balance valve flap. Brown's accessible disconnecting trap. George Jennings, lipped urinals; anti-percussion bath valves; shampooing apparatus. Washington Lyon, model of fixed disinfector, by steam. Maguire & Co., method of joining drain pipes; clean water flush tank; disconnecting trap; Dr. Scott's disinfecting stove. Henry Owen, water-waste preventer. J. Purnell & Son, white stoneware channels; Woodward's wash-out closet, with flushing rim; syphon action water-waste preventer. Wm. Ramsey, Claughton's trap. Sanitary Engineering Company, Weaver's drain disconnecting trap. Shanks & Co., Bramah valve closet, with ventilation to valve box; wash-out closet, with flushing rim; cast-iron enamelled bath; bath fittings. C. H. Sharp & Co., water closets for ships; earth closet. H. Sharp, Jones, & Co., rock concrete tubes. The Shone Drainage, Sewerage, and Water Supply Company, pneumatic sewage ejector. Steven Brothers & Co., cast-iron enamelled bath. James Stiff & Sons, Weaver's drain disconnecting trap, Weatherly single-dip disconnecting trap for sinks and waste water. T. Pridgin Teale, diagrams of defective sanitary arrangements. J. Tyler & Sons, slop sink, with galvanised top and regulator valve. John Warner & Sons, valve closet, with flushing rim and movable valve seating. Robert Weare, inodorous carbon closet commode. Wilcock & Co., disconnecting gully trough closet. James Woodward, wash-out closet basin, with flushing rim and trap; hopper closet basin, with flushing rim and trap; porcelain sinks for refreshment bars.

The following exhibits were not considered in competition, being invented by one of the judges:—Bowes Scott and Read, Field's flush tank; Field's annular syphon for flushing sewers.

SECTION XVI.—WATER-SUPPLY AND FILTRATION.

Judges.—Prof. Francois de Chaumont, M.D., F.R.S.; R. B. Grantham, M.Inst. C.E.; Prof. Prestwich, F.R.S.

First Class.—E. and J. Gardner, various forms of filters on Major Crease's (now Lieut.-Col. Crease, C.B.) patterns; also, 'Carferal' filtering material. Silicated Carbon Filter

Company, filtering medium and filters, with asbestos strainer. Spongy Iron Domestic Filter Company, water filters, spongy iron and prepared sand, earthenware filter-cases with late improvements. J. Tyler & Sons, waste-not valve applied in various forms to cisterns, closets, courts, and alleys.

Award of Merit.—John Bolding & Sons, workmanship of cocks and valves, specimens of workmanship in lead pipes made by Graham and Fleming; Defries & Co., blocks of pumice and granulated carbon; Henry Doulton & Co., manganous carbon filter (Bernays's patent); automatic aërated cistern filter (Bailey-Denton's); A. Emanuel & Sons, deep-well pumps, valves, and cocks; Hayward, Tyler, & Co., valves and cocks; George Jennings, drawn lead pipes by Dubois; P. A. Maignen, 'Filtre Rapide,' with asbestos cloth, etc.; Maguire & Co., patent renewable filter; Quirk, Barton, & Co., tin-lined lead pipes; Sanitary Engineering and Ventilating Company, cistern filters, portable filters, and table filters; G. T. Tonks, glass balls for ball valves and frictionless balance supply-valve.

SANITARY EXHIBITION AT EASTBOURNE.

FROM the 22nd to the 27th August, the fashionable town of Eastbourne was the scene of an Exhibition of Sanitary and Domestic Appliances, that for a provincial display was well worthy of praise. The authorities of this healthful resort claim that their town is *the* one in the kingdom 'where all sanitary arrangements are attended to perfectly'. This is a bold assertion. This fashionable watering-place is, however, one of the most modern of sea-side health-resorts, and it has been aided by the capital and intelligence of a wealthy nobleman, the Duke of Devonshire, who was patron of the exhibition. It may therefore readily be understood that the resources of modern science have been used to secure immunity from the dangers arising from imperfect construction or careless sanitary fittings. Although a long array of names of Vice-Presidents and Council figured in the catalogue, the honour connected with the inception of the exhibition was due to E. W. C. F. Schmidt, Esq., the treasurer, and Mr. J. T. Rodda, the secretary, but mainly, we believe, to the last-named gentleman; and it is fair to add that both exerted themselves to the utmost to secure the success of the undertaking. One somewhat unfortunate feature however was that, owing to the number of exhibits having exceeded the space the committee had at command in the Devonshire Pavilion, a temporary erection had to be built to accommodate the surplus exhibits, and this erection was at some little distance from the main building; an objectionable arrangement which is always to be avoided if possible in any exhibition. To give a detailed description of the exhibits may be considered unnecessay here, as in our last number we concluded our report of the South Kensington Exhibition, from which many of the articles had been removed to Eastbourne, or similar ones had been sent by the same firms. In sanitary appliances proper, Messrs. Doulton and Co., Lambeth; Messrs. Stiff & Sons of the same locality; Messrs. Henry Sharp, Jones, and Co., Poole; Messrs. Wilcock and Co., Barmantoft, Leeds; The Shone Drainage, Sewerage, and Water Supply Co., Limited, showed to advantage in their various specialities, and one or two local exhibitors made a large display of goods of a kindred character. Mr. D. J. Bostel, of Brighton, was present with his Patent Closets, Lavatories, and Hall's Patent Ventilator; and a good collection of Closets, Pumps, Lavatories, and general sanatory and Bath fittings was made by Mr. F. G. Underhay, Crawford Passage, Farringdon Road, E.C. The 'Shrewsbury' Valveless Closet Flushing Apparatus, and Valveless Waste Preventor was shown by Mr. Gregory, Station Road, Clapham, S.W. An excellent display was made by Mr. Samuel Owen, Fann Street, Aldersgate Street, which consisted of an Enamelled Bath of the best make, a Japanned Roman Bath and Fittings, several attractive Closets, some of which were handsomely fitted and mounted, and an almost endless variety of the numerous fittings required for baths, lavatories, and plumbers' work generally. Mr. W. H. Lascelles, Bunhill Row, E.C., exhibited several very excellent specimens of concrete work, including Chimney Pieces, Moulding and Paving Slabs, and a very pretty Red Concrete Window, a class of ornamentation that is rapidly coming into use; and Messrs. S. and E. Ransome, of Essex Street, Strand, introduced a variety of specimens of stone bricks, etc., covered with their patent solutions for the cure of damp walls and for preserving stone from decay. The wall decoration of the 'Lincrusta Walton' make, which is advertised in our pages, was also to be seen, and the Papyrotile Co., Holborn Viaduct, contributed several specimens of their patent decorations for covering walls, etc. Messrs. R. Boyle and Son, Holborn Viaduct and Glasgow, as usual made an attractive display of their many ventilators. Mr. E. S. Banner, Billiter Street, also illustrated his well-known system of ventilation, and Mr. Ellison, of Leeds, was also present with his Patent Conical Perforated Ventilating Bricks, Air Diffusers, etc. The 'Autothermakon', or Self-acting Ventilator and Temperature Regulator of Messrs. Gilmore and Clark, of Danby Road, Peckham Rye, attracted much attention. This ingenious little appliance, which is fitted into the wall of a room in connection with an air brick, is worked automatically by the expansion of the metal, and as the heat of the apartment rises is gradually opened, allowing the heated air to escape. It is also applied to ovens, conservatories, and garden frames, in connection with a fire alarm, and even to the human body, for ventilating hats. The system is simple, and provided that the balance is kept clean, should be accurate in its working. Messrs. Davis and Co., Kennington Park Road, sent a similar assortment of barometers and optical instruments, as shown by them at South Kensington.

Improved grates, ranges, and heating apparatus generally, without which, we are glad to say, no exhibition of this character now appears to be complete, were extensively shown, Messrs. Steven Brothers, of Upper Thames Street, E.C., showing to advantage with one of their tiled coving Kitcheners with nickel plated mounts. As we fully described the main features of this kitchener in connection with the exhibition at South Kensington, it is unnecessary to refer to it again here. The Wilson Engineering Co., Edwards and Son, Great Marlborough Street, Mr. Constantine, Fleet Street, John Wright and Co., Birmingham, the Tortoise Heating Stoves of Messrs. Portway and Son, Halstead, and Messrs. Ritchie and Co., of St. Swithin's Lane, were each well represented by their different stoves and heating apparatus, all of which have received full descriptions at our hands. Mr. C. R. Stevens, of Loampit Vale, Lewisham, whose Patent Steam and Hot-air Heaters we described in our report of the South Kensington Exhibition, has already made an important improvement in his apparatus. In place of the circulating pipes being made round, Mr. Stevens now employs an oval section, which while giving the same amount of radiating surface, economises the quantity of steam required, and so the consumption of fuel. It will be readily understood that where steam is used in whole or in part for distributing heat by radiation, in a round pipe, a large portion in the centre of the pipe is comparatively useless, and is, so to speak, created and run to waste without being brought into requisition, and by substituting an oval pipe very much of this waste is avoided. The Smoke Consuming and Ventilating Grate of Mr. Griffin, 69, Fenchurch Street, to which we have alluded on previous occasions, was also shown, so also were the heating apparatus of Mr. Robert R. Gibbs, of Liverpool, who has recently introduced a new Register Grate, in which the bars and back are formed of tubes as a medium for carrying hot-water pipes over the house, and to which we purpose alluding more at length on a future occasion.

Mr. William Stobbs, the Secretary of the Anthracite Coal Company, who has done much to familiarise the public with the advantages of this beautiful smokeless fuel, was present with several stoves and ranges in which it was being burnt. Amongst these we notice the Crown Jewel Stove of Mr. Harry Hunt, the Kyrle Grate of the Coalbrookdale Co., a range of Messrs. Brown and Green's, of Luton, Beds, and a glazed Terra Cotta Stove of Messrs. Cliff and Sons.

obbs took a certificate of merit (the highest award) exhibits.

rs. J. Jones and Son, Bankside, S.E., made a good with their various boilers, coil cases, etc., amongst eing their popular double L saddle boiler, which is a onomically constructed one, and is made in various o suit the requirements of any building. The new ngine of Mr. Turner, of St. Albans, Herts, attracted ttention, being at work and driving a printing press ssrs. Parsons and Simpson, of Eastbourne, the pub- of the *Eastbourne Standard*.

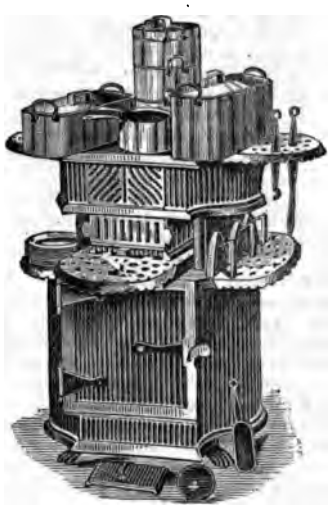
R. Adams, Great Dover Street, Borough, S.E., similar exhibit to the one we described at South ngton. A simple mode of lifting heavy sashes, by of cords and the hands (Langridge's patent), was by Mr. J. A. Skinner, Eastbourne; and Messrs. n and Co., Baker Street, W., exhibited their Patent w, which has been before the public for some time. anitary Engineering and Ventilating Co., Victoria Westminster, sent several of the sanitary appliances hich their names have become familiarised; and little useful domestic articles, including some sanitary ls, with a self-acting valve to prevent the escape of nt odours were contributed by Mr. Ernest Miroy, n Victoria Street, E.C.

. William Sugg and Co., Limited, Westminster, active stand displayed a large assortment of their urners, Globes, etc., illustrating their Improved f Domestic and Street Lighting, and Mr. Thomas inchester, exhibited his system of Ventilation for ilway Carriages, and Buildings generally, which ll known to need further comment. The Patent r' Mattress, Camp, and Invalid Beds, and other s, bearing that name, and which are always to be ur advertising pages, were shown in charge of tees, Messrs. Chorlton and Dugdale, Manchester, ual secured a large amount of attention; and Mr. of Ship Street, Brighton, one of whose Invalid re illustrated in our report of the South Kensing- ition, was also present with several specimens of niture, amongst them being the 'Grasshopper' ne of the cheapest invalid appliances of its charac- a luxurious appendage called the 'Sybarisian' hich can be turned into a commodious and elegant and the 'Söfva' combining both couch and chair able arms, foot-rest, and head supports, elegantly ed, and forming a luxurious lounge for invalid or ent. Some cheap and effective kitcheners of a ss were shown by Messrs. Pryke and Palmer, of hames Street. They are well known in the trade, the names of the 'Perfect', the 'Acme', the , and 'Climax'. They are more or less apper- close ranges, and are compact and well suited for uses. Registers and Slow Combustion Grates of price were also amongst the exhibits, which, in comprised an extensive assortment of cabinet ndry, door furniture, locks, and plumbers' goods , and a new and simply constructed Tenoning with two parallel saws, which, in their motion the action of the hand to a nicety. It is said that machine one man can cut the tenons of six four- ors in one hour. A good collection of wood- machinery in motion, driven by a seven-horse rtable steam engine of their own make, was by the well known firm of F. W. Reynolds and n Works, Blackfriars, S.E.

W. Hobbs, Queen's Buildings, Southwark ad, contributed a very good perspective drawing wellings, as designed and erected for the National vellings Company, 49, Cannon Street, E.C., on the old Queen's Bench prison, Southwark Bridge r. George Jennings, Stangate, S.E., whose exhibits of a high order of merit and superior finish, sent his specialities in lavatories, closets, water waste and other articles appertaining to this class of mongst them his new shampooing apparatus was hich can be fixed with ease to an ordinary lava- Wherever water is laid on in the household.

Messrs. Charles Drake and Co., Railway Wharf, Battersea Park, exhibited a noble marble concrete bath, specimens of fireproof concrete upper floors, finished in Mosaic marble, monolithic concrete walls, built with their patent building slabs with Mosaic marble interior surfaces, etc., and an attractive Mosaic marble chimney-piece, hearth, and fender, forming a handsome suite. Specimens of fireproof staircases, roofs, upper floors, and doors, also fireproof, helped to make up an excellent display, and were well worthy of attention. The county of Sussex is not without its manufactories of terra-cotta and stone ware, and a creditable display was sent by Mr. Uriah Clarke of Hellingly, which comprised red and white terra-cotta, chimney pots, ornamental ridge tiles, vases, etc., as well as a variety of articles of glazed terra-cotta for horticultural and domestic uses. Mr. Alfred Walker of Leeds sent a very pretty pilaster in red concrete in the Queen Anne style, a classic ornamental cornice of the same material, and a variety of other articles used in building as substitutes for stone. Washing machinery was exhibited by Messrs. Bradford and Co. of London and Manchester, but presented no new feature beyond one on a large scale suitable for hospitals or public institutions, driven by steam power, and capable of washing fifty shirts at one operation.

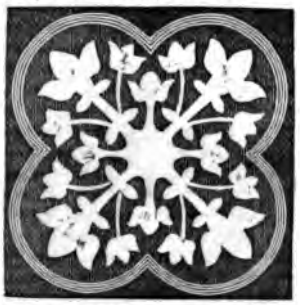
The 'Sunlight' Stove Company, Blackfriars Street, Manchester, exhibited the Portable Cooking Stove bearing this name, with its numerous and ingenious cooking appliances which we illustrate. Though not absolutely new, it is not so well known as it deserves, and it is admirably adapted for a large section of the community where space and economy in use, combined with a complete cooking apparatus, are required. The idea of this stove originated with a lady connected with the school of cookery at South Kensington, but it has been considerably improved and developed by the firm into whose hands it has passed. It occupies but a small space on the floor, and contains a large oven, besides a roasting fire, hot plate on top, and the trivets shown around it are all detachable, and can be used for ordinary cooking purposes, heating flat irons, etc., the heat from the fire being sufficient for such purposes. The principle sought to be enunciated is that a small quantity of fuel, if properly used, can be made to produce a large amount of heat if proper combustion is attained, and the makers have certainly succeeded in effecting this object. The fire is in the upper part, and the heat



from it is carried down a descending flue at each side, around and under the oven, which is at the bottom, and so upwards at the back to the outlet pipe. The doors in front of the fire slide to and fro, to increase or diminish draught, which is also regulated by a sliding ventilator underneath. The usual boiler is dispensed with, but in its place an ingenious arrangement is provided for supplying hot water for domestic purposes and for bath-room, etc.,

which effectually prevents the danger of explosions, etc. This is obtained by carrying a coil of pipe over the fire in connection with a large cylinder or reservoir, which may be placed in the kitchen or on one of the upper floors. As this cistern is comparatively cool, so long as there is a supply of water it must always remain full, and, even were the supply to cease for a time, and be suddenly let on, no explosion could occur, there being no boiler to expand, and the water must attain a sufficient amount of heat before it reaches the circulating pipes over the fire to prevent any danger. But a further safeguard is provided, and the whole hot-water apparatus can be detached in a few minutes by any intelligent person, and the stove be used without it. Although the ordinary cooking utensils can be used with the 'Sunlight' stove, specially constructed ones are provided, and we recommend any purchaser to possess himself of them, as several advantages the stove possesses will be lost without them. They consist of a combination steamer in three vertical divisions, having a meat boiler or stewer at the bottom, which may also be used for soup, a steamer for puddings in the centre, and another for vegetables at the top. A fish steamer, which enables the fish to be cooked without losing its nourishing qualities, a meat steamer of similar construction, a boiler or fountain, to take the place of the usual fixed boiler, as a permanent heater of water, that stands on the nozzle of the outlet pipe at the back of the stove, a small utensil called a frizzler, for bacon, chops, etc., and a roaster for the front of the fire, in which a joint of fair proportion can be cooked. The boiling or stewing vessels have double lids, filled with a non-conducting material, which tends to keep the top cool and economise the heat. The Sunlight stove is a complete *multum in parvo*, and stands alone amongst the cooking apparatus of the day as regards its ingenious appliances.

Mr. H. C. Webb, of the Tileries, Worcester, exhibited his new invention for the ornamentation of wood for flooring, walls, ceilings, etc., shown for the first time at the Exhibition of the Sanitary Institute of Great Britain at Exeter last autumn; it there elicited a great amount of attention, and much curiosity was evinced at the extraordinary effects produced. Like many new inventions, particularly those introducing entirely new effects, the first attempts are not



always as satisfactory to the inventor as he would wish them to be, and although to the ordinary observer the wood blocks as shown at Exeter were perfect, Mr. Webb desired to make slight alterations in them, that in his opinion would add to their worth. As seen at Eastbourne, the idea may be said to be perfectly satisfactory to the patentee, who now offers them with that confidence that should always attend a radical change in any application. The invention consists in ornamenting blocks of wood from one to one and a half inches thick, and of any reasonable size in squares, with ornamental patterns in imitation of the ordinary clay or porcelain tiles, in fact, if we may be allowed a misnomer, they are wood tiles with this difference, that instead of the pattern being painted on the surface, it is forced entirely through it by hydraulic pressure, and so effectually that the entire design is perfectly visible on the under-part of the block. The wood is used the way of the grain, the design is as clear and sharp on the surface as a painted tile, and the singular feature of the process is that the colours, of which there may be several, do not appear to 'run' in their passage through the wood. Planed off from their sur for some distance down, the design appears as perfect a the surface, and we have thus an ornamental pattern wood, that may be made of the most intricate design in any number of colours practically indestructible, requiring no attention for years beyond washing, and may be produced at a moderate cost. We can see objection to this invention, while from a sanitary poin view, as well as from the economic, its advantages are great as to immeasurably outweigh any diffidence to its from the most fastidious.

The exhibition was made additionally attractive to visitors by the delivery of a daily series of lectures sanitation and various matters conducive to health; Carpenter, Professor Kerr, Mrs. F. Johnstone, and oth having kindly attended for that purpose. The follow awards were made:—

CERTIFICATES OF MERIT.

In the Pavilion.

Doulton and Co., Lambeth, London, fine art potte etc.

Lye and Wheeler, 40, Terminus Road, Eastbourn Limoges (china), flower-pots, vases, statuettes, paint plaques.

D. T. Bostel, 18 and 19, Duke Street, Brighton, Bostel' patent tip-up lavatory, basins, Hall's patented ventilator and other sanitary appliances.

J. A Skinner, Eastbourne, for Skinner's valve-closets, etc.

F. G. Underhay, Crawford Passage, Farringdon Road, London, closets, pumps, well frames, ball valves, lavatories.

Doulton and Co., Lambeth, London, water waste preventers, baths and bath apparatus, sanitary appliances.

W. H. Lascelles, 121, Bunhill Row, London, red concrete window, paving and moulding slabs, and chimney pieces.

Walton and Co., 9, Berners Street, Oxford Street, London, Lincrusta new wall decoration, non-poisonous.

The Silicate Paint Co., 107, Cannon Street, London, paints, enamels, etc.

Wilcock and Co., Burmantofts, Leeds, glazed bricks, pottery, and sanitary apparatus.

Doulton and Co., Lambeth, London, Terra Cotta mantelpieces with patent fire apparatus.

James Ed. Ellison, Victoria Square, Leeds, Ellison's patent conical perforated ventilating bricks and air-grates, valves, etc.

Papyrotile and Co., 14, Holborn Viaduct, London, E.C., the Papyrotile decoration.

James Stiff and Sons, London Pottery, Lambeth, London, for Stiff's art stoneware, sewer air traps, and terra cotta, etc.

R. Boyle and Sons, 64, Holborn Viaduct, E.C., and 110, Bothwell Street, Glasgow, self-acting air pump ventilators.

J. Davis and Co., 6, Kennington Park Road, London, S.E., for Polytechnic and Aneroid barometers.

Eugene Rimmel, 96, Strand, London, W.C., scents, etc.

Steven Bros. and Co., 35 and 36, Upper Thames Street, London, E.C., kitchen ranges and cooking apparatus.

William Hamilton, 45 and 46, Ship Street, Brighton, Hamilton's combined wheel and carrying chair, and other invalid specialities, etc.

F. Fisher, Calverley Street, Tunbridge Wells, electric bells, etc.

Chorlton and Dugdale, 19, Blackfriars Street, Manchester, mattresses and beds.

In the Annexe.

J. W. Parrett, Alexandra Rustic Works, Sydenham and Forest Hill, summer houses, garden seats, etc.

George Jennings, Sandgate, London, S.E., for valve closets and urinals.

Charles Drake and Co. (Limited), Railway Wharf, Battersea Park, London, concrete baths, floors, etc.

Spence's Metal Manufacturing Co. (Limited), 31, Lombard Street, London, E.C., Spence's metal for jointing pipes, etc.

The Wilson Engineering Co. (Limited), 247, High Holborn, London, smoke consuming stoves and ranges.

k, Dicker Pottery, Hellingly, Sussex, fancy
rra Cotta work, etc.
Edwards and Son, 49. Great Marlborough
ın, patent smoke consuming slow-combustion

ıtine, 61, Fleet Street, London, smoke con-
ng range, and Dicks' patent fire extinguisher.
ht and Co., Essex Works, Broad Street,
and 155A, Upper Thames Street, London,
cookers.
chie and Co., 23, St. Swithin's Lane, London,
ıeating stoves.
ght' Stove Co., 19, Blackfriars Street, Man-
ıng stoves, baking and roasting apparatus.
ens, 56, Loampit Vale, Lewisham, London,
d steam and hot-air heaters.
ary Engineering and Ventilation Co., 115,
et, Westminster, S.W., scientific, sanitary,
cisterns, etc.
r, Dulwich, London, for various types of
ing, etc.
phrey, Eastbourne, plaster models of houses.
nd Sons, Eastbourne, patent stoves and grates.
ugg and Co., Limited. 1 and 2, Grand Hotel
haring Cross, W.C., Vincent Works, West-
., and Paris, lamps, burners, and ornamental

ynolds, Blackfriars, London, E.C., portable
s and mechanical tools.
ner, Eastbourne, window sashes, etc.
:on, Ship Street, Brighton, invalid furniture.
cock, of Dudley, Worcestershire, patent dairy
l utensils.
ner, St. Albans, gas engines for printers.
ı, the Borough, London, window fasteners,

HONOURABLE MENTION.

ɔs., 25, Chancery Lane, London, W.C., for
ps, etc.
n, 104, Strand, London, W.C., 131, High
ɔndon, W.C., 29, Cheapside, London, E.C.,
Polytechnic, Regent Street, London, for metal

radford and Co., 140, High Holborn, London,
ng machines.
ɔd Co., Belgrave House, Argyle Square, Lon-
food and fruit drinks.
. Gibbs, Mill Street, Liverpool, boilers and

nd Clark, Danby Road, Peckham Rye, fire
ilators, etc.
4, Pump Street, London Road, Manchester,
urners.
nd Sons, 6, Bankside, London, S.E., boilers
s.
r Water Meter Company, Tipping Street,
anchester, water meters, etc.
79, Queen Victoria Street, City, London,
liances.
47, Fann Street, Aldersgate Street, London,
tings.
ınd Co., Limited, Croydon, tonic beverages.
Pragg, 9 (late 35), Crown Street, Soho, Lon-
e filters, etc.
l Palmer, 48, Upper Thames Street, London,
ls and furniture, etc.
ıfrey, 3, Hanover Place, Eastbourne, models

ınby, 36, Terminus Road, Eastbourne, for
ıdestals, etc.
mons and Son, Terminus Road, Eastbourne,
, lamps, etc.
ɔs, Victoria Buildings, Pimlico, stoves, etc.,
racite coal.
orcester Tileries Co., Rainbow Hill, Worcester,
ɔr blocks.

rnoon of the last day Mr. G. G. Banner, C.E., lectured on 'Sanitation and Ventilation,' the chair being occupied by Dr. Ellis. In the evening Mr. I. Shone, C.E., lectured on 'Defective and Effective Hydraulic and Pneumatic Drainage and Sewage Engineering.' Mr. R. Pidcock presided.

Mr. Shone premised his remarks with a description of the work which engineers had to do in building bridges, aqueducts, etc., and said that the most difficult part of their task was that which related to the carrying away of sewage in an efficient manner. That they were often prevented from doing in an efficient manner by a false spirit of economy. Mr. Shone then went on to explain the facility, and at the same time the efficiency, with which drainage could be carried off by the Pneumatic Ejector, which is now in use at Eastbourne, and illustrated its action in house drains, w.c.'s, etc.

INTERNATIONAL TEMPERANCE EXHIBITION.

THIS exhibition, the first of its kind ever held in this, or, we believe, in any country, was recently held at the Agricultural Hall, Islington, and we may assume that the promoters of total abstinence have thrown down the gauntlet to the brewers and distillers, who now hold an annual exhibition at the same place. The friends of temperance may be congratulated upon this, their first attempt, and probably another year, if it is continued, may see a further development, which will also have our hearty support, though we are not disposed to recommend many of the non-alcoholic drinks, for which latterly a perfect rage has apparently set in. A large number of those exhibited are known, and require no remarks from us beyond the fact that they were shown; while of many others, we may add, the public will not be any losers if they never hear of them again. The most prominent display was that of the Apollinaris Company, who occupied the most prominent position in the centre of the Hall, who symbolised their supremacy in the world of mineral waters by having a lofty obelisk built up of bottles of their renowned table-water. A pretty erection of virgin cork, with fountains, was built by the Harzer Waters Company, and the different sizes in which the water is bottled were extensively displayed. Other natural mineral waters shown, were the Genovova, obtained from a deep Artesian well-spring near Niedermendiz on the Rhine; the Godesberg Mineral Spring Company, from Godesberg on the Rhine, an alkaline steel water; the Gerolstein Natural Mineral Water; the Wilhelms Quelle, the St. Galmier, exhibited by Messrs. Gallais and Co., Margaret Street, W.; Sulis Water, the natural product of the mineral thermal springs of Bath, shown by Mr. Cater of that city; the "Roisdorf", from the well-known springs of Bonn, on the Rhine; the Flitwick waters, from Ampthill, Beds., which we reported upon in connection with the International Sanitary and Medical Exhibition; and the Rosbach, bottled at the springs bearing that name near Homburg. Of manufactured aërated waters there was a large collection, and of the made-up drinks a legion.

The proprietors of Zoedone made an extensive display, and another large obelisk was composed of the popular Vin Santé, and the various Montserrat fruit syrups, including limejuice, limetta, aromatic Montserrat limefruit bitters, Montserrat quinine cordial, and a new and attractive sauce prepared from the Montserrat limefruit juice. Vin Santé has won great favour as a most agreeable medicated beverage, containing iron, phosphorus, etc., and, when mixed with some of the fruit syrups to which we have alluded, makes a most enticing drink. Vin Santé was the only aërated artificial drink that received a prize medal at the International Food Exhibition held in London last year. It is made both sweet and dry, and its uses are indicated by the iron and phosphorus which it has in solution.

The Zoldat and Ginger Ale of Messrs. John Begg and Co. of Bolton are beverages to which no exception may be taken, and there is ample testimony in their favour by several well-known medical men. There were several other makers of ginger ale present who, however, call for no particular remark. Several beverages of a non-alco-

holic character were shown by Messrs. Idris and Co., Mansfield Road, Haverstock Hill, including sparkling phosphade, which appears likely to be a popular drink of this medicated class. There was no lack of fruit syrups, and Messrs. Rose and Co. of limejuice cordial fame, supplemented their exhibit by an immense 'dummy' bottle of the shape they use for their limejuice. Of teas, coffees, cocoas, etc., there were numerous exhibitors. Mr. Branson with his excellent and pure Coffee Extract, which was freely distributed, coming in for a large share of gratuitous custom. A good display of Aërated Water Machinery was made by Messrs. Barnet and Foster, Forston Street, New North Road; Hayward, Tyler, and Co., Whitecross St.; and Mr. Davenport, High Holborn.

The display of Water Filters was very weak, but the Silicated Carbon Filter Company, Battersea, made a good display; and Mr. Maignen, Great Tower Street, was present with his 'Filtre Rapide'; and Messrs. Defries and Son, Houndsditch, had a general assortment of Fittings for Coffee Taverns, of which there was a very fair display. Messrs. Parnell and Son, of Bristol, having a complete bar fitted up, and Mr. Hogben, of the City Road, had an extensive display, including gas cooking apparatus, and every necessary for a restaurant, whether of the temperance or alcoholic order.

The most attractive display, however, of pure temperance restaurant appliances was made by Messrs. Matthew Hart and Sons, of Birmingham, who exhibited for the first time at any exhibition. An old-established firm connected with the tin and japanned trades, they have of late years paid much attention to coffee tavern and restaurant fittings, and the collection sent to this exhibition, does them great credit. There was no particular novelty in their exhibit, except a Heat-retaining Urn, which we illustrate, and in appear-

ance this is not different to the ordinary type of coffee urn, but it has an outer casing packed with a non-conducting material that keeps the coffee hot for several hours without attention and obviates the objection of having a gas jet constantly burning underneath. The bulk of the articles shown were nickel-plated, and got up in the best style. The firm are doing a large trade in the fitting up of temperance restaurants, etc.

The National Effervescent Fountain Company, of Grey Friars Road, Ipswich, exhibited a new Portable Fountain or Miniature Apparatus for preparing aërated drinks, intended to stand upon the counter and draw off the liquid by means of a tap. They are made of copper, as the larger apparatus, and encased, as our illustration depicts, in a strong oaken case bound with hoops, which may be nickel plated if required. Its interior arrangements are somewhat on the principle of the seltzogene. It is perfectly self-contained, requiring no machinery to work it, and will make from 10 to 30 pints, according to size of apparatus, of pure soda-water in a few minutes, at less than one far per glass. It is a most useful appliance to those who e use or sell any quantity of aërated water, and it w understood from our description there is nothing to b or even get out of order. The small sizes are well ad for families or private use, and may be made of any mental design, while the larger ones are suitable fo mists' use, coffee taverns, etc., and will no doubt be a ciated by those requiring such apparatus.

Messrs. Feltoe and Sons, Albemarle Street, sh their new Lime Juice, which we have mentioned former occasion; and the Aylesbury Dairy Company a good disptay of their specialities.

Such an exhibition would not have been complete out cooking apparatus, which is as necessary in a disp temperance articles as in any other; accordingly w the Wilson Engineering Co. and the Eagle Range vieing with each other with their respective cooking ra and Messrs. H. and C. Davis and Co., of Camber made an extensive display of their gas cooking appa and heating stoves and appliances, including enam cooking ware. A notable feature on this stand was a ambulating carriage for the sale of tea and coffee, of w the firm have made a large number for the Church England Temperance Society, and which was sold the f day the exhibition opened.

EXHIBITION OF GAS APPARATUS AT WESTON-SUPER-MARE.

An exhibition of a similar character to those that have been held in many other towns in the kingdom dur ing the last four years, was opened in this popular western watering-place on the 7th inst.; and considering the size of the place and the issues, so to speak, involved, the display would have done credit to a more extensive locality. As yet, Bristol, where we should have expected the lead to have been taken in the western portion of the kingdom, has shown no signs of developing the use of gas by such means; and the credit therefore must be accorded to Weston in having taken the lead in the locality around the large city. This exhibition was not a private speculation, but was promoted by the Gas Company of the town, and has been superintended and carried out under the able management of their engineer and manager, Mr. J. W. Helps. Most of the gas exhibitions proper have been held in those towns where the supply of gas has been in the hands of the Corporation; but we do not recollect any that have been promoted by independent gas companies, and several criticisms have from time to time been passed upon these bodies for the apparent indifference they appeared to take in the question of the proper development of their commodity. The step taken by the Weston Gas Company is then one in the right direction, and we hope it will be followed by many others, as it has long since been clearly demonstrated that gas will become an important factor in the cooking and heating arrangements of the future, whatever may happen to it as a lighting medium. If not the largest, the exhibition made up in quality what it may have lacked in quantity, and many of the most popular makers were present with their specialities, or were represented by local agents. Thus, Mr. Felix Thomas, the largest ironmonger in the town, exhibited the goods of Messrs. Leoni and Company, Limited, the principal features of which have been described and illustrated in our pages. The specialities of Messrs. Verity Brothers, of London, with which our readers have been made acquainted through the medium of our columns, found an able exponent in the same firm. Mr. T. Fletcher, of Warrington, entrusted his apparatus to the same hands; so also did Messrs. Stark and Co., of Torquay, a firm who have recently come to the front in the manufacture of gas cooking and heating appliances. The novelty in Messrs. Stark's Stoves, Cook's patent, is that they are heated by one, two, three, or more ordinary fish-tail burners, according to size of stove, two of these burners being sufficient for an ordinary sized family cooker; and that the gas is not allowed to enter the oven or

: at all, but is allowed to permeate all around and l to a storage chamber at the top, where it is super-, and can only escape by descending a small pipe l down to nearly the bottom, by which means the :ts become mainly condensed. This arrangement es the prejudice that still exists with many persons t gas cooking stoves where the gas itself comes in :t with the viands.

)ther meritorious invention of Messrs. Stark and Co. Automatic Lever Gas Pressure Governor, for regu- the consumption and supply of gas to the burner; so sensitive and reliable in its working, that if every r in a large establishment save one was turned off, ing or increased consumption would take place in e left alight; and the saving effected by the use of :tle instrument has been clearly demonstrated to be 5 to 30 per cent. Mr. Thomas also exhibited the ' Gas Governor, Messrs. Carnaby and Co.'s of n gas apparatus for regulating supply, the cooking of Messrs. Beverley and Wilde of Leeds, which excellently constructed apparatus, and the Two-Gas Engine of Mr. Andrew of Stockport, a most engine, made also in one-man power, in which t is adapted for many domestic purposes, such as g a washing machine, mangle, knife cleaners, etc. iety of elegant gas fittings, gas baths, etc., also bore 'homas's name, and the collection was completed on rt by a large display of the well-known gas burners ssrs. George Bray and Co. of Leeds, as well as the ful gas lamps made by this firm, many of which are :ected in London; and specimens of them were shown e the Town Hall at Weston. These new lamps of ɨ. Bray and Co. are some of the most powerful in ice, and economic for the amount of light given; and :cent improvement, a double service has been added, inged that at any moment when the necessity for a light has ceased, the consumption can be reduced : of an ordinary street lamp. All these lamps are :ly shadowless, a very important feature in such aces.

srs. H. and C. Davis of Camberwell Road, London, r firm of whose manufactures the SANITARY RE- has given particulars of many examples, were repre- by their local agent, Mr. G. Fox, ironmonger, and n nowise behind their competitors in the variety of exhibits or their quality and finish; and Messrs. Hill, Constitution Hill, Birmingham, were also re- ted by Mr. Fox. Messrs. Hill exhibited a variety of and economic Boiling Stoves, some low-priced Cook- ves, and several Radiating Heating Stoves. Mr. Fox id charge of Messrs. Ewart and Son's, Euston Road, n, well-known Gas Bath, and Messrs. Ritchie and t. Swithin's Lane, London, were present with their r Lux Calor Heating and Ventilating Apparatus.

Charles Wilson, a well-known maker from Leeds, fair collection of his manufactures, including Gas ners of various sizes, Hot Plate and Griller, Wash- pper, Gas Bath, etc.; and Messrs. Davis and Son of who were one of the earliest makers of Gas Ap-, sent a variety of their appliances, including their r stove, the 'Cook's Pet', a good and reliable article ill purposes. They also showed a Radiating Stove, a combined chamber and tubular boiler for heating conservatories, etc.

rs. John Wright and Co., Birmingham, who exhi- *propria persona*, had perhaps the largest as a single in the hall; and Messrs, Webster and Co., Notting- ho cling to the Duplex system of lighting, which im is superior, as to power of lighting, over all , exhibited their various Burners and Sanitary for bed-rooms, conservatories, etc. Messrs. Cowan ., Westminster, sent specimens of their Gas Meters, small Model Governor; and several Registering , Calorimeter, etc., were exhibited by Messrs. A. ight and Co. of Westminster.

rs. Wm. Sugg and Co., Limited, Westminster, who rly be said to divide the honours as regards gas bur- eet lamps, etc., with Messrs. Bray and Co., had a fine assortment of Burners, Painted Globes, and their powerful Street Lamps with London Argand and Flat Flame Burners, and in the neighbourhood of the exhibition four 100-candle power lamps and one of 150 power were fixed, combining their Whitehall, Lambeth, and Westminster Pattern Lanterns. An interesting exhibit of the various products derived from coal was shown by Mr. G. Lyon of Knottingsley, Yorkshire. The Weston Gas Company contributed several interesting instruments; and a complete Model of Gas Works, which we think we have seen before, was lent by Charles Hunt, Esq., engineer to the Birmingham Corporation Gas Department. Messrs. J. Davis and Co., Kennington Park Road, exhibited several instruments connected with gas, such as Specific Gravity and Aniline Tests, Gas Gauges, Oven Thermometers, and their usual assortment of Barometers, etc. The exhibition was well attended, and, we believe, has been a success.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

CARLISLE URBAN.—Dr. Elliot's present report is a decided improvement upon that for the previous year. Whilst the latter was but a mere collection of tables, the report for the past year descants at length upon the sanitary condition of his district, and the borough appears to have been thoroughly and systematically inspected. During the year 1,288 births and 777 deaths (of which 76 were in public institutions) were registered, equal to rates of 37.0 and 22.0 per 1000 respectively. Zymotic diseases were responsible for 106 deaths, or 30 more than in 1879. This increased mortality is more than accounted for by the fatal prevalence of infantile diarrhœa, 42 cases of which terminated fatally. The greatest mortality occurred as usual in the third quarter of the year, when 31 deaths happened. Dr. Elliot attributes these deaths to the consumption of unsuitable food (such as fruit unripe, or otherwise in a bad condition), and to the want of breast milk. Scarlatina was prevalent throughout the district, but only 18 fatal cases occurred. Fifteen deaths are recorded as due to typhoid fever, and, as usual, the fever hospital was of great value.

EALING.—This district compares favourably, as regards its death-rate, with any other of the places in the immediate vicinity of the Metropolis. For the past year Mr. Patten reports a rate of 12.2 per 1000, by far the lowest ever recorded in the district. The zymotic death-rate also diminished, the rate last year being 1.84, against 3.75, 5.08, and 21.9, respectively, for the three preceding years. A few cases of fever occurred, but none terminated fatally. Mr. Patten, at some length, points out the difficulties caused by the absence of any system for the notification of infectious diseases, and suggests the provision of hospital accommodation, and of disinfecting apparatus. This the Sanitary Authority would do well to provide, seeing that the district is now within easy reach of the Metropolis, and thus of Metropolitan infections. A considerable improvement was made during the year in the flushing arrangements, and the Building Bye-Laws of the Local Board would seem to be increasingly regarded.

LONGTOWN RURAL.—Mr. Walker reports for this district a death-rate of 18.5 per 1,000, a rate which, as he rightly observes, is higher than it should be for a district circumstanced such as this. Six deaths were due to zymotic causes; 3 occurring from typhoid fever, 2 from scarlet fever, and 1 from croup. The deaths from diseases of the respiratory organs were, as usual, high. Mr. Walker appears to have made thoroughly systematic inspection of his district, but no great progress has been made in its sanitary improvement.

MERTHYR TYDFIL URBAN.—This populous district now contains a population of 48,500 souls, and includes within its area of 17,714 acres several mining villages. The death-rate during the past year is returned at 25.6 per 1000, which is in excess of any of these recorded for the past fourteen years. The infantile mortality was also excessive, no less than 264

deaths occurring in infants under one year of age, or nearly 21.2 per cent. of the total, and 510 (or 41 per cent. of the total) in children under five years of age. Mr. Dyke, commenting upon this excessive mortality, states that 'the excessive prevalence of measles was the cause of the increase of the death-rate among children. This disease was especially prevalent in Ynisowen, where, within a few weeks, many hundreds of children were affected, though only 2 deaths were registered. On the approach of the cold weather, however, measles increased in virulence, and the total deaths from it during the year amounted to 122, 112 of which were children under five years of age. An outbreak of scarlet fever followed closely upon that of measles, and although only three deaths were registered, Mr. Dyke has fears of the subsequent spread of the disease. There was a decrease in the number of deaths from enteric fever, 14 fatal cases happening last year; whilst typhus was credited with 2 deaths. The sanitary condition of the district appears to have received the earnest attention of the Health Officer, but many defects still exist. In some parts of the district there is an entire absence of closet accommodation, and in other localities, where such accommodation does exist, the arrangements appear far from satisfactory.

MIDDLESEX AND HERTFORDSHIRE COMBINATION.—For the past year Dr. Saunders presents, as usual, an excellent report, which shows clearly enough that the district has been thoroughly and systematically inspected. In an interesting preface to his reports on the several districts in the combination, Dr. Saunders makes some very striking remarks on the condition of the district as a whole, from which it appears that the majority of the labourers' cottages are in a filthy condition, whilst little has been done towards the removal of the abominable open privies which abound in the district. The provision of accommodation for the isolation of infectious cases is again urged, and the absurdity of the present difference between the powers of Urban and Rural Authorities is expatiated upon. Many of the districts of this combination, situated as they are so near the Metropolis, are rapidly springing up into populated centres, and the erection of new houses without the control of efficient bye-laws will be a fruitful cause of future mischief. Even where the Sanitary Authorities have building bye-laws they are rarely enforced, and in the St. Albans Rural Sanitary District, where building is going on, no control whatever is exercised over the plans. The drainage at Friern Barnet is very defective, some part of the village being described as presenting the appearance of a dismal swamp, the roads being unmade, and many of the houses hardly accessible. The water-supply of Potters Bar still remains unsatisfactory. In the Barnet Urban District nuisance has arisen from the improperly flushed sewers. 'To undertake to remove sewage by water-carriage,' says Dr. Saunders, 'and then to omit the water, is very like the attempt would be to scavenge the town with a bottomless cart.' At Hemel Hempstead the fatal prevalence of infantile diarrhœa was undoubtedly due to defective drainage, and having regard to the probable extension of the town, the adoption of some sewerage scheme seems desirable. The death-rate for the whole district, based upon a population of 97,383, was 15.8 per 1000, 30.4 per cent. of the total deaths being those of infants under one year of age. This excessive infantile mortality was due chiefly to the prevalence of diarrhœa, which alone claimed 7.6 per cent. of the total deaths. Scarlet fever was not absent from the combination during the year, and there were also several outbreaks of typhoid. A number of cases of small-pox occurred during the year, one of which occurred in the person of a rag-picker at a paper mill who had not left the village to which he belonged for many months, and for whose attack no other cause could be alleged than the nature of his occupation.

OKEHAMPTON RURAL.—Mr. Lennington Ash did not succeed to the health-officership of this district until the year was well advanced, so that a complete report is hardly to be expected. Mr. Ash appears, however, to have made the best of the time at his disposal for inspecting the district. The water-supply is ample and of good quality, but the existence in many places of shallow surface-deep wells is unsatisfactory, and their proximity to drains, privies, and the like, renders their use for drinking purposes very risky. Moreover, the Water Act of 1878 does not seem to be enforced, and the authority would do well to see that this important adjunct to the Public Health Act is carried out. Nuisance removal appears to have received attention, but the disposal of excrement is unsatisfactory, privies and open cesspits abounding, and in some cases being dangerously near the wells. During the year there were 277 deaths, equal to a rate of 16.0 per 1000, a rate which Mr. Ash thinks too high for a district so extensive, elevated, and sparsely populated as Okehampton. Measles were prevalent in the early part of the year and fatal in 14 cases. Whooping-cough, scarlet fever, diarrhœa, and typhoid fever were also more or less prevalent in a modified form, and in each case Mr. Ash attributes their spread to the mischievous agency of schools.

POTTERSBURY RURAL.—Mr. Macquire's report on this district is not altogether satisfactory, but in the future fuller reports may be expected. The existence of many insanitary conditions is pointed out, but there is no record of the result of any systematic infections which the health-officer is required to make. One part of the district is described as being honeycombed with cesspools, with constant leakage into the wells; and defective arrangements exist for sewage disposal. The death-rate for the year was 18.14 per 1000 against 17.22, an increase due entirely to the excessive infantile mortality. Measles were epidemic during the latter part of 1879 and the early part of last year. Diarrhœa and typhoid fever were prevalent in a sporadic form during the summer and autumn, and were fatal in 13 cases. The water-supply of Stony Stratford, which bears by no means a good sanitary name, needs the especial attention of the sanitary authority.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

MATERIALS OF HIGHWAYS.

1881. *Ramsden* v. *Yeates*. "Highway Act, 1835," ss. 53-4—Available materials in a field not accessible otherwise than by a road through private avenue—Held, nevertheless, that the material might be got, and if damage were done to the avenue, further compensation would be payable. (50 L.J., M.C., 135; L.R., 6 Q.B.D., 583; 44 L.T., 612; 45 J.P., 538.)

RATES.

1880. *Clark* v. *Alderbury Union*. Railway refreshment rooms—Principle of assessment. (50 L.J., M.C., 33; [*Clark* v. *Fisherton-Angar*] L.R., 6 Q.B.D., 139; 45 J.P., 358.)

HIGHWAY REPAIRS.

1881. *Exford Iron Co.* v. *Dulverton H.B.* "Highways Act, 1878," ss. 23, 36—"Extraordinary traffic"—What evidence is necessary to support a demand for a special contribution—Company held liable for serious damage done by carting immediately after a thaw. (At Sess.) (45 J.P., 80.)

RATING OF HOUSES AND LANDS.

1850. *North Dublin Union* v. *Scott*. 1 & 2 Vict., c. 56, s. 106. [Irish, but substantially the same as 43 Eliz., c. 2, s. 2]—A house unoccupied, or in the possession of a caretaker, is not liable to be rated to Poor Rate. (1 Ir. C.L.R., 76.)

RATING OF MARKET TOLL.

1871. *London, Mayor* v. *St. Sepulchre Overseers*. Tolls taken simply in respect of articles carried into a market are not rateable. (L.R., 7 Q.B., 333*n*.)

RATING OF INSTITUTIONS.

1881. *Trinity College, London* v. *St. Marylebone Vestry*, 6 & 7 Vict., c. 36—Institution registered as a limited Company without that word appended; its primary object music, but other elements of education included which were not necessarily connected with "Fine Art"—Held not exempt. (At Sess.) (*Times*, Feb. 7, 1881.)

OVERFLOW OF WATER.

1879. *Box* v. *Jubb*. Water stored in reservoir—Overflow of, on neighbour's premises, from causes beyond owner's control, namely, the act of a third party—Owner held not liable for the damage done. *Fletcher* v. *Rylands* distinguished. *Nicholls* v. *Marsland* followed. (48 L.J., Ex., 417; 41 L.T., 97.)

INJURY TO HOUSE.

1880. *Burgess* v. *Northwich L.B.*, "Public Health Act, 1875," ss. 144, 149, 179, 308. Highway—Houses abutting on road raised by Board to obviate inconvenience from floods—Houses raised by owners—Compensation for cost of this not payable by Board, as the alteration in the level of the road had not been done under the "Public Health Act"—And s. 308 refers to powers created by that Act, and not to powers created under the "Highway Act, 1835," but merely transferred. (50 L J., C.P.D., 219; L.R., 6 C.P.D., 264; 44 L.T., 154; 45 J.P., 256.)

OVERFLOW OF SEWER.

1881. *Dixon* v. *Metropolitan B.W.* Flood gates of sewer opened to permit the flow of a great quantity of storm water—Damage to plaintiff's wharf and barges by sudden rush of water—Held that the Board had not exceeded its statutory powers, and had only used the sewer as far as it was entitled to do. (*Times*, May 16, 1881.)

PAVING EXPENSES.

1881. *Caiger* v. *St. Mary's, Islington, Vestry*. "Metropolis Management Act, 1855," 105, 250. "Baptist Chapel" on leasehold land held a "house," there being no dedication of it in perpetuity as a place of worship—Trustees liable for paving expenses. (50 L J. M.C., 59; 44 L.T., 605.)

CONTRACT WITH MEDICAL OFFICER.

1880. *Eaton* v. *Basker*. "Public Health Act, 1875," s. 74. Contract not under seal between Local Authority and medical man to attend fever patients at so much a head—Doctor's bill eventually exceeded £50, and payment refused by the Local Authority—Held that the section did not apply, for the said contract when entered into did not amount to £50, and, therefore, the Local Authority was liable. (50 L.J., Ex; 444; 44 L.T.; 45 J.P., 703.)

ADULTERATION OF FOOD.

1881. *Harrison* v. *Richards*. "Sale of Food Act, 1875," ss. 6, 21 — Certificate by analyst that certain milk was adulterated with 20 per cent. of water—Nevertheless, summons dismissed by magistrate, partly because milk was shown to have been standing some hours; cream had been largely taken from at top; but sample analysed taken from near bottom, and, therefore, bottom portion might be expected to be thin without having been adulterated—Magistrate's decision held bad—He ought not to have ignored analyst's certificate. (*Times*, March 23, 1881.)

BURSTING OF WATER MAIN.

1881. *Kennett* v. *East London Water Co.* Stand-pipe erected during frost—Negligence in fixing, whereby great quantities of water escaped on to surface of highway and ice—Accident to plaintiff in crossing the highway—Verdict for plaintiff—Damages, £200. (At Nisi Prius.) (*Times*, April 2, 1881.)

POLLUTION OF RIVER BY SEWAGE.

1881. *Reg.* v. *Middlesex J.J.* Prosecution of Local Board by Thames Conservators for alleged pollution of River Colne by sewage—Complaint dismissed by Justices—Thereupon Conservators appealed to Sessions—Prohibition issued to Sessions forbidding the appeal being heard Only where there has been a conviction can there be an appeal—An unsuccessful prosecutor has no right of appeal. (45 J.P., 420.)

BUILDING BY-LAWS.

1881. *Reg.* v. *Thompson*. By-law that every new street should be 30 feet wide—Plans deposited and sanctioned for eight new houses, plan showing a 30 feet new street therewith—Houses built within 9 feet of owner's boundary, and no provision made by him for a 30 feet highway—Conviction for breach of by-law—Conviction quashed—Semble, that a man building an isolated row of houses is not bound in all cases to show a roadway of full width appurtenant to the houses, but that the width of the roadway must stand over till someone else proposes to build opposite to the houses. (45 J.P., 420; *Times*, June 16, 1881.)

WIDTH OF NEW STREET.

1880. *Sunderland, Mayor* v. *Brown*. New Street—Infringement of by-law prescribing minimum width—Held on the facts that the owner was the person who had "laid out" the street, and that as the builder of the houses had had nothing to do with the laying out a summons against him for alleged breach of the by-law was rightly dismissed. (44 J.P., 831.)

REVIEWS.

On the Domestic Water-Supply of Redditch. By HERBERT PAGE.

THIS is a careful and elaborate account of the author's work and observations during six years. Having stated that the potable water of Redditch has been hitherto derived from 'shallow surface wells', he proceeds to describe the *hydrography* of the district, but attaches little importance to this subject, since the river water is not employed for drinking purposes.

The annual rainfall and the amount of rain falling upon the district during different months is next stated; and a brief description of the geological strata of the neighbourhood follows, from which it appears that the upper stratum is 'saliferous clay overlying the new red sandstone'. Analyses are then quoted from the sixth report of the Rivers Pollution Commission for 1868, proving that the new red sandstone is one of the best water-bearing strata in Great Britain.

A comparison follows between some analyses of 'pure potable waters' by high authorities and some analyses of purest waters of the Redditch district, in which the Redditch waters hold their own fairly well, though it is noteworthy that the chlorine is decidedly higher in the latter, and they consume more oxygen, whilst the albuminoid ammonia is not more abundant than in the pure natural waters. This would have led us to suspect the presence of *nitrites* or ferrous salts in the Redditch waters, but the author states that nitrous acid and metals were absent. Carbonaceous organic matter is therefore indicated. The subject of well waters is next introduced. They are divided into shallow and deep, the former being less than fifty feet, the latter 100 feet and upwards in depth. There are said to be 650 wells in the district, of which only *four* are deep.

The Rivers Pollution Commissioners are now again quoted, to show that deep well waters are generally purer than shallow ones, the water having undergone a more extensive and perfect filtration through a greater depth of soil. In accordance with this, the results of analyses of the waters of the four deepest wells of the district, the shallowest of which is 114 and the deepest 170 feet in depth, show their contents to be fairly pure, the albuminoid ammonia averaging 0.07 parts per million, and the oxygen consumed 4.2 parts per million. The eighth table in this elaborate paper gives the depth of thirty-nine wells—taken as fair samples of the whole 650—with the depth of their water. Tables XII and XIII at the end of the paper show the surface levels of the district, and give a diagrammatic representation of the levels.

The mean depth of the wells, excluding the deepest, is 42.8 feet, so that they must be classed as shallow surface wells. Such wells are known to be 'exposed to excremental pollution', especially when 'sunk near human habitations and in porous soils' (Rivers Pollution Commissioners).

These shallow wells of Redditch are sunk in the superficial strata of drift, sand, and gravel. 'They are', in the words of Mr. Page, 'usually located in the immediate rear of the premises, close to habitations and drains, and at no great distance (frequently under sixteen feet) from middens,

etc. The drain, usually covered by the worthless 'bell-trap' situated beneath the pump for its overflow, is constantly utilised for slop drainage, thus causing surface pollution at the very mouth of the well', and in connection with drainage it must be remembered, that a well drains an area of soil around it like an inverted cone, its base having a surface-diameter of about three times the depth of the well'.

'The domestic drainage is frequently bad, often ancient. The wells are usually steined with four-and-a-half inch common rectangular brickwork, without cement or other setting, or cement lining. Instead of the mouths of wells being properly domed with brickwork and cement or covered with a stone flag, the *universal* practice is to simply cover the opening, within two or three feet of the surface, with wood.'

As Mr. Page truly remarks, under all these circumstances it cannot be wondered at that but few of the waters furnished by these wells are hygienically or analytically safe for domestic use. Then follows evidence to show that not only is the water supplied to the unfortunate inhabitants of Redditch suspicious as to quality, but that it is also deficient as to quantity, the author computing it at not more than 'six gallons per head per diem'. The impurity and unsatisfactory nature of the water from these wells, is completely proved by the results of 120 analyses of samples carefully made according to a definite system, and as carefully analysed. These results are tabulated, and the deductions drawn from them are lucidly explained. This concluding portion of the paper is, however, rather of interest to scientific men. The *causes* of the pollution, so easily preventible, yet so lamentably common, have most interest to the sanitarian, and are most important to the public at large.

Rainfall and Climate in India. By Sir J. FAYRER, K.C.S.I., M.D.

THE meteorological statistics contained in this brief paper, which was read before the members of the Victoria Institute at their meeting held on May 16, 1881, are compiled from Mr. Blandford's Tables of the Indian Climate, and afford a useful *resumé* of temperature and rainfall. Sir J. Fayrer states in the beginning of his paper that he should restrict his remarks almost entirely to the rainfall and its causes. He therefore refers to the physical peculiarities of the country, and especially to the influence of the monsoons in giving rise to the heavy falls which occur especially on those parts of the coast and adjacent country upon which the winds come in contact after passing over the sea. The rainfall on the southern and western coasts is the heaviest, but there are many variations owing to physical conditions, the elevated regions receiving almost a deluge, whilst some low-lying areas are very dry. Three-fifths of India are under British rule, and consequently the observations are made under the directions of the meteorological department. India is divided into twenty-one rainfall provinces, containing 1,074,000 square miles, with about three hundred stations, and in one table the mean rainfall in each province is given for 1878. In Sind and Cutch the mean rainfall was only 9.24 inches, in Mysore and South Hyderabad 27 inches, whilst in the central states it was 42, in Western Bengal 51, in Lower Bengal 67, Assan and Cachar 98, and Malabar and Ghauts 113; in Konkhan and Ghauts 119, in Tenasserim it was as great as 170.7, and in Arakan 171 inches. Large as are these last-named figures, they are absolutely dwarfed by the enormous falls which occur in certain districts. Thus at Mahableshwar, in the Western Ghauts, the annual rainfall is about 300, whilst at Cherra Poonjee, in the Khasia Hills, Sir J. Fayrer registered 610 inches in one year. From another table we learn that the average annual rainfall in Calcutta is 63 inches, at Madras 48.5, at Lucknow 39.5, and at Delhi 36 inches. In Silchar 113, Darjeeling 120, Rangoon 101, and Akyab 198 inches, whilst in Mooltan it is only 7.4, in Kurrachee 7.37, and Peshawar 14.7 inches.

The *mean* temperature at a few well-known stations alone are given, viz., at Calcutta, where it is 89° in May and 70° in January, ranging between 45° and 92°; at Madras in June 86°, January 76°, and the range from 72° to 92°; Bombay, May 86°, January 74°, range moderate; Peshawar, June and July 91°, January 52°, range great; Punjab, June 89°, January 54, range from 32° to 110°; Bangalore, May 81°, January 69°, range moderate; Poonah, May 85°, January 70°; Belgaum, April 81°, May 78°, June 75°, December 70°.

The effects of a dry and damp atmosphere at the same temperature are very different, as dry air in motion, at a temperature of 100° is more tolerable than stagnant air loaded with moisture, so that the hot dry winds of Northern India are more endurable than the cooler but saturated atmosphere of Lower Bengal or parts of Southern India. Sir J. Fayrer says that although fluctuations in the death-rate are not altogether due to variations in the rainfall, yet they are to a great extent influenced by it. The statement seems to be proved by what obtains all over India. He also says that continued dryness, evaporation and high temperature, increases the number of deaths from cholera, whilst heavy rain greatly diminishes them. That dryness, heat, and rapid evaporation reduce the intensity of fevers; but rain following greatly increases their intensity, although not immediately, as it is not so much the great amount of rain as the soaking and saturation that does the mischief. Small-pox in India does not appear to be related to rainfall, as this disease augments with increase of heat, and so continues until cold weather arrives, being therefore the reverse of what occurs in England. The liability to bowel diseases appears to be augmented by 'rain with cold and high temperature range'. Sir J. Fayrer also mentions amongst other subjects irrigation by canals or other great works.

Charitable and Parochial Establishments. By W. SAXON SNELL, F.R.I.B.A. London: Batsford, High Holborn. 1881.

THIS splendidly illustrated book aims at supplying designs for public buildings, such as workhouses, infirmaries, hospitals, and district schools. This is work in which the author has been much engaged, and in connection with which his name is honourably known.

An architect to a Board of Guardians or a Local Authority has often a peculiarly difficult task; he has, in the first instance, to provide for the exigencies of inflexible official regulations of the Central Authority, which are necessarily often as rigid in principle, as they are inconvenient in application. He is bound by space, limited as to funds, and subject to the special necessities of what are often most inconvenient sites and impossible existing structures, with which his own must either harmonise or seem to do so. Thus the author rightly suggests that his plans, and especially the earlier ones, must in each case be judged, not with a view to theoretical perfection, but to the actual requirements of the occasion. There can be no doubt of the intelligence and the success with which Mr. Snell has fulfilled his mission. One of his first designs is that for the infirm wards of Marylebone Workhouse, where it was a necessity that the required wards to hold the inmates should be nearly sixty feet long, and although it was predicted that under the circumstances such wards could not be well ventilated, and could only be temporary, they have since won high approbation, have been repeatedly imitated and are acknowledged to be amongst the most successful in London.

All the drawings in this book deserve careful attention, and some of them are of special theoretical as well as practical value. Our space at the present time will not admit of detailed criticism, but we should like to call attention to a system of circular hospital wards, which we should like to see carried out, and to the details of lavatories, water-closets, etc., on all of which Mr. Saxon Snell has a great deal to say worth the attention of practical men. The directions for hospital buildings and public institutions may be studied with profit by hospital managers, local boards, and public authorities generally, who are contemplating the erection of buildings for the care and housing of the sick and pauper population of the kingdom.

Report for 1880 *of the Medical Superintendent of the Stockwell Fever and Small-pox Hospital.*

DURING the year there were 1,014 persons under treatment in the Fever Hospital, of whom 882 were admitted, 826 discharged, 126 died, and 133 remained under treatment on December 31, against 203 on January 1. One child admitted with scarlet fever 'developed small-pox a considerable time afterwards, and subsequently measles whilst in the hospital'. A woman admitted for scarlet fever also developed measles a considerable time after admission, her children at home having that disease. There were 402 patients admitted during 1880, of whom 387 had small-pox and 15 other diseases. There was not one death amongst 185 persons having 'discrete' small-pox, *i.e.*, when the pustules were distinctly separated from one another, 4 deaths amongst 102 cases of 'coherent small-pox', no less than 44 out of 96 confluent cases, and all of the hæmorrhagic variety. Out of the deaths, 18 occurred amongst the vaccinated cases, 2 only being without complications; whilst amongst the unvaccinated there were 26, and no less than 13 died from uncomplicated small-pox. There were 8 deaths amongst the doubtfully vaccinated, of whom 2 died without complications. The percentage of deaths amongst the vaccinated was 6.8, of the doubtful 33.3 per cent., and of the unvaccinated 29.0 per cent. Mr. Bernard, the medical superintendent, says that many patients were sent from houses where the cisterns for holding the drinking water communicated with the drains through an untrapped waste-pipe. He speaks strongly of the necessity for compulsory re-vaccination. He says, also, that small-pox does not spread from the hospital, but he is of opinion that there should be an entirely separate entrance for the fever patients and visitors so as not to pass through the small-pox grounds. There is only one entrance at Homerton, where numerous small-pox cases have occurred amongst the fever patients. As many as 1,056 visits were paid to patients, and, as far as is known, no one caught the disease. The rules for visitors are stringent, and the advice for their behaviour whilst in the hospital is good.

The Public Health and Local Government Act, 1875, *and the Statutes incorporated therewith.* By J. V. VESEY FITZGERALD, B.A., Barrister-at-law. Third Edition, pp. 468. London: Waterlow, Bros., and Layton. 1881.

AMONG the numerous compilations professing to expound and annotate the Public Health and associated Acts, none is more useful and practical than the edition edited by Mr. Vesey Fitzgerald, who adds to a sound knowledge of general law a particular acquaintance with the principles of sanitary legislation. The fact that his book has already reached a third edition, is sufficient evidence of its appreciation by those for whose guidance and instruction it was in the first instance compiled. Since the passing of the Public Health Act, a variety of Acts relating to the same question (*e.g.*, the Canal Boats Act, the Factory and Workshops Act, the Water Act, the Interments Act, and others) have received the sanction of Parliament, and there is especial need, therefore, of the bearing of these Acts upon the principal Act being pointed out and accurately explained. This Mr. Fitzgerald has done with complete success in the new edition of his book. We have carefully criticised the notes, which after all constitute the real value of a work of this sort, and can testify to their general completeness and accuracy. There are one or too practical points on which it might have been more helpful to enlarge at greater length, but the dimensions of the volume are already so formidable, that the editor has had to sacrifice many things that he would otherwise have expatiated upon. In the arrangement of the book, that of the Public Health Act is strictly followed, the parts of the associated Acts dealing with the same subject matter being interpolated (with distinctive headings) between the sections of the principal Act. This is not only very convenient, but saves a vast amount of trouble and research. A copious index adds much to facility of reference to the book, and a table of cases cited (which amount to some hundreds in number) will also be helpful to legal readers. Obviously, in a book of this kind, there is little scope for detailed criticism; but it may be said with truth, that so far as arrangement and careful annotation go, the work is worthy of much praise. Great pains have evidently been taken to make the volume complete, and to bring the information it contains down to the latest possible date. As a work of reference on the subject of which it treats, it has certainly no superior, and but few equals.

Carbonic Oxide as a Source of Danger to Health in Apartments Heated by Cast-Iron Furnaces or Stoves. By IRA REMSEN, Professor of Chemistry in the Johns Hopkins University.

THIS paper is written with the object of throwing new light upon the discussion as to whether carbonic oxide gas is capable of making its way through heated cast-iron. The possibility of such an occurrence was hinted at by M. Carret to account for the symptoms observed in a peculiar epidemic which occurred in the Savoy in 1865. The author first describes the method adopted by MM. Deville and Troost, with a view to determine the *quantity* of carbonic oxide exhaled from a cast-iron furnace. This consisted briefly in aspirating air from a chamber contained between cast-iron walls, the inner one being the wall of a furnace which the chamber surrounded, over pumice stone moistened with sulphuric acid and over caustic potash. The air thus freed from carbonic acid and moisture was then made to traverse a tube containing heated copper oxide, and the resulting carbonic acid and water were collected and weighed. No stress was laid upon the results thus obtained, since no allowance was made by the experimenters for the carbonic acid due to the combustion of *hydrocarbons* which might be present in the cast-iron chamber, produced by the destructive distillation of the coal, and traversing the cast-iron wall of the furnace along with the carbonic oxide gas.

More careful experiments followed, which were conducted by a Committee appointed by the French Academy, and including MM. Payen, Morin, Fremy, H. St. Claire Deville, Boussey, and Claude Bernard. This Committee arrived at the conclusion that 'Cast-iron stoves, as soon as their temperature reaches dark red heat, cause the escape of very considerable quantities of carbonic oxide, a very poisonous gas.'

Now, Professor Remsen, having arrived at conclusions from his own researches, which tend to throw doubt upon the accuracy of the observations of the Committee appointed by the French Academy, proceeds to enumerate what he calls three good reasons for doubting that accuracy. The first of these is that the amount of carbonic oxide found by the Committee, viz., 0.04 per cent. by volume in the air of the cast-iron chamber, is higher than the truth, since the Committee arrived at that result by allowing for the coexistence of *marsh gas* with the carbonic oxide, whereas Professor Remsen states that other hydrocarbons, containing a larger proportion of carbon than marsh gas, are 'just as likely to be present.' Now, that higher hydrocarbons than marsh gas result from the destructive distillation of coal is of course granted; but that they would be just as likely to traverse a heated wall of cast-iron seems rather more than doubtful. In the first place, having heavier molecules than the marsh gas, such higher hydrocarbons would have greater difficulty in forcing their way through the pores of the heated iron. Again, these higher hydrocarbons are less *stable* than marsh gas, and even if they escaped decomposition in the interior of the furnace, would be very likely to give up a portion of their carbon to the heated iron during their passage through the wall of the furnace, becoming thereby reduced to the state of marsh gas.

The second objection raised by Professor Remsen is, that *aërial organic matter* might, by being burned in the heated copper oxide tube, increase the production of carbonic acid, and thus unduly raise the computed amount of carbonic oxide in the air around the furnace. When it is remembered that the inner wall, at all events, of the chamber from which the air was aspirated into the copper oxide tube was *heated to dull-redness*, it seems little pro-

bable that any appreciable quantity of organic matter in air traversing the chamber would escape conversion into carbonic acid and water. Neither does it seem probable that much organic matter would escape the tubes containing sulphuric acid and caustic potash, which the air was made to traverse before reaching the copper oxide tube.

Moreover, the third source of error pointed out by Professor Remsen, viz., the escape of a portion of carbonic acid gas from absorption by the caustic potash tubes, applies equally to the researches of Erisman, who is said to have found organic substances in the air of a room by the method of Deville and Troost. The carbonic acid, supposed by him to be due to oxidation of organic matter in the air, is just as likely to have escaped absorption by his purifying apparatus as a portion of that attributed to the oxidation of carbonic oxide by Deville and Troost is to have escaped theirs.

But there is yet another source of error in the experiments of Deville and Troost of which no mention is made by Professor Remsen, namely, the almost impossibility of removing all the *moisture* from air by drying tubes. Now, this moisture would tend to increase the apparent production of water in the copper oxide tube, and would consequently increase the computed amount of *hydrocarbon*, and correspondingly *decrease* the estimated percentage of carbonic oxide in the air around the chamber, thus counterbalancing the possible error due to imperfect absorption of carbonic acid by the purifying apparatus.

These strictures of Professor Remsen have been dwelt upon at some length, because they do not seem to us to offer any valid evidence against the accuracy of the work done by the French Committee.

So much for the *quantitative* estimation of the carbonic oxide in the air around the cast-iron furnace; but a *qualitative* experiment adduced as evidence of the presence of carbonic oxide by the French Committee is also objected to by Professor Remsen, namely, the absorption of the gas by a solution of cuprous chloride in hydrochloric acid, followed by its liberation and combustion. The objection raised here is, however, so vague as to be hardly worthy of notice, merely consisting in the remark that 'other things might have been present, and that the test was a very unsatisfactory one.' It seems to us, on the contrary, that the test was very satisfactory and conclusive, the only common gas likely to be absorbed along with the carbonic oxide by the reagent employed being acetylene, which produces, when burned in the air, a flame, so utterly different from that of carbonic oxide as to render any confusion between the two impossible.

Having made these criticisms upon the work of the French Committee, the author proceeds to enumerate the work done by various chemists bearing upon the point in question. Some experimenters have confirmed the statements of the French Committee, *e.g.*, Kaiser and Aug. Vollert; but their experiments are barely mentioned, and dismissed without discussion.

The method of H. Vogel for detecting small quantities of carbonic oxide gas in air consists in the examination of the absorption spectrum exhibited by blood which has been shaken with the gas. Stress is laid upon the fact that Vogel failed by this method to detect carbonic oxide in the air of buildings examined by him, though this statement is perfectly irrelevant, since the maximum degree of delicacy attained by Vogel himself in the use of this test only enabled him to detect 0.25 per cent. of carbonic oxide in a gaseous mixture, whilst the quantity found by the Committee in the furnace air was but 0.04 per cent.

The experiments of Gottschalk are then described. He passes the suspected gas through a neutral solution of palladium chloride, and states that he can detect 0.022 per cent. of carbonic oxide by the flocculent precipitate of metallic palladium it produces in the solution. In the 'air of the school-houses' which he examined, Gottschalk found no evidence of carbonic oxide by his method. This negative result does not, however, throw any imputation upon the accuracy of the results obtained by the Committee, for if only 0.04 per cent. of carbonic oxide existed in the air of a confined chamber immediately surrounding the cast-iron stove, it may readily be conceived that after diffusion through a 'school-house' the amount might be reduced considerably below 0.022 per cent., the limit of delicacy of the test.

The author, in his own experiments, used a modification of Vogel's method, first applied by W. Hempel. Mice were exposed to the action of air contaminated with carbonic oxide gas for some time, their blood becoming more or less saturated with the gas in consequence. When exposed for 2½ to 3 hours to the action of air containing known quantities of gas, the blood of the mice was found to give evidence of carbonic oxide when 0.05 per cent. of the gas was present. This is the limit fixed by Hempel to the delicacy of his own test. The author and his assistant, by extreme care, were enabled to detect 0.04 per cent., exactly the amount found by the Committee in the air around the furnace. Now much stress is laid upon the point that in several cases no carbonic oxide could be detected by the Vogel-Hempel method in the blood of mice, which had been placed for a time not stated, in the immediate vicinity of the hot-air flues leading from various notably-bad stoves. Granted that the air in these places contained less than 0.04 per cent. of carbonic oxide gas, how does this touch the report of the French Committee? The hot-air flues would hardly be red-hot, and the mice were not placed in confined chamber built around the flues. Neither do the experiments which follow seem to prove anything contradictory to the report of the committee. Mice were placed in a funnel, through which air from between two plates of cast-iron, one of which was kept red-hot by combustion of coal, was constantly drawn. No evidence of carbonic oxide was found in the blood of 4 mice in 4 experiments. But we are told that 20 litres of gas (air) were drawn through the funnel in one and a quarter hours. Now, in the experiment which fixed the limit of delicacy to the test, 14.5 litres of air containing 0.04 per cent. of carbonic oxide were drawn through the funnel in two and half hours; so that in this experiment the mouse was exposed to the action of the gas for double the time occupied by each of the four experiments quoted; and, though the total volume of gas passed was ¼th larger in the shorter experiments, this would probably not ensure a greater contamination of the animal's blood with carbonic oxide, the rapidity and depth of the respirations being supposed equal. As quantitative experiments, then, these are valueless. To sum up, it seems to us that the statement of the French Committee stands unshaken by all subsequent investigations, and this important matter must still occupy a leading place in the minds of sanitarians.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

SANITARY LITERATURE.

Having been requested by some members of a Ladies Sanitary Association of this town to recommend some tracts for general distribution, I thought I could not do better than obtain for them some of the excellent little pamphlets issued by the London Association. Accordingly I wrote for several of these, among others one bearing the title, 'The Black Hole in our own Bedrooms', price one halfpenny. This little tract is in many respects admirably adapted for the purpose it is intended to serve, and from its cheapness it probably enjoys as large a circulation as any of them. It is a great pity, then, that its usefulness should be marred by such a sentence as this, 'Cholera, scarlet and typhus fever, and small pox, are all found to be produced by the bad air coming from drains, cesspools, rivers dirted by sewers, filth of all kinds, and want of fresh air'. To teach people that scarlet fever and small-pox are caused by bad air coming from drains, etc., is to lead them to disregard the proper safeguards against the spread of those diseases. And those who, like myself, find it no easy task

to impress on the public the importance and necessity of precautionary measures, are hindered by the enunciation of such fallacious doctrines. Surely the case against foul air is sufficiently strong as it is, and, if I might be allowed to do so, I would suggest to the editing committee that in reprints of this otherwise excellent little pamphlet, the objectionable sentence be omitted.

EDWARD SEATON, M.D.,
M.O.H. to the Borough of Nottingham.

Nottingham, September 2, 1881.

THE SANITARY INSTITUTE.

Can you kindly inform me when and where the Annual Meeting of the Sanitary Institute is to be held this Autumn? H. SAGE.

16, Prospect Hill, Redditch, 6th September.

*** We believe that it is this year omitted.—ED.

PUBLIC GYMNASIUMS IN PROVINCIAL CITIES AND TOWNS.

Would you kindly allow the insertion of a few lines urging upon wealthy municipalities the importance, and even the necessity, of granting in perpetuity a small freehold site for the erection of every kind of athletic apparatus, and thus afford to the citizens, townspeople, and even to visitors, a perpetual source of health-giving recreation? A few square yards of ground, exclusively devoted to this admirable purpose, would be well bestowed by every Corporation.

AUGUSTUS HARVEY, F.R.G.S.

6, Cromwell Terrace, Southtown, Gt. Yarmouth.

SANITARY INVENTIONS.

NEW PATENT SYSTEM OF HEATING BY HOT WATER OR STEAM.

A novel, effective, and comparatively inexpensive system of heating by hot-water, in which gas, mineral oil, or any other fuel can be employed as the heating agent, has been invented by Mr. G. E. Pritchett, F.S.A., architect, of 20, Spring Gardens, S.W. Like many new ideas, the original has been materially developed by the inventor, and as we propose to give a detailed description of the various modes of using it, which may extend over two or three numbers of the SANITARY RECORD, we shall take them in order as they have suggested themselves to the patentee. Mr. Pritchett received a first-class award at the recent Sanitary and Medical Exhibition at South Kensington for his invention, the main principle of which is, that in place of the ordinary cumbersome and expensive circulating pipes, objectionable in many instances, he employs galvanized and corrugated iron or copper sheets formed into chambers with only about one-eighth of an inch water space for his circulating medium. The advantages here gained are immense, as for instance, a heating surface of twenty superficial feet is obtained with as little water as would be required for one foot of four-inch pipe, the cost of fuel being correspondingly reduced, and the flow and return pipes being necessarily small, are inexpensive also. The chambers can be made of any size, to suit the requirements of the building to be heated, and our first illustration (Fig. 1) represents the idea carried out in connection with a skirting and dado. The corrugations here may be left open to view, as in the illustration, and be ornamented in accordance with the decoration of the room, or they may be hid by panels made of various materials, at the taste of the owner. In carrying out this system of warming an apartment, we believe the whole expense, including the labour of fixing, etc., would be considerably less than by the ordinary circulating pipes, besides which the room would be materially improved in general appearance; and such an heating arrangement may be carried out effectually, as regards fuel by gas burners or mineral oil lamps, coke, or steam. When required for conservatories, etc., the corrugated chambers are simply run along the walls, placed behind platforms, or fixed in any convenient part. They take but little space, projecting not more than 1½ inches from a wall, and will do as much work as three rows of 4 in. round pipe, and for super-heating they can be fixed in connexion with any existing pipes, and brought in or out of action by means of small taps. Fig. 2 represents an 'independent' heater, which may be removed from room to room as required, and can easily be arranged to admit fresh air from the outside, making it a ventilating as well as a heating radiator Here a double set of corrugated plates are used, giving them, when fixed together, the appearance of tubes, and it is through these that the fresh air from without would pass, becoming warmed as it travels upwards, and supplying a constant current of pure warm air at almost any degree, without necessarily lowering the temperature of the apartment. This, too, is heated by gas or mineral oil, etc., and it will be observed that a circular descending flue of a larger size than the primary one is affixed at the side of it. This is provided for the purpose of cooling down the products of combustion; and, at its base, a further precautionary arrangement exists for neutralising the effects of carbonic acid gas, should the æriform fluid be used, consisting of a bag which dips into a vessel containing a chemical liquid, such as chloride of calcium. The bag is kept moist by capillary action, and the products of combustion passing through the pores of the bag. meet the chemical solution, and its ill effects are neutralised. The simplicity of Mr. Pritchett's invention cannot be gainsaid, and now that public attention is being directed to the easiest and most economical mode of heating our houses with the least production of smoke, may be utilised to great advantage. Further illustrations of the system will be given in our next.

(To be continued.)

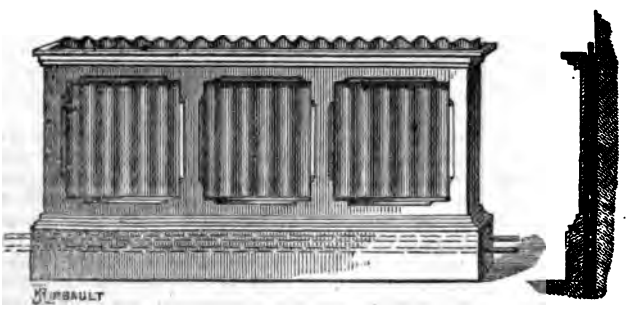


Fig. 1.

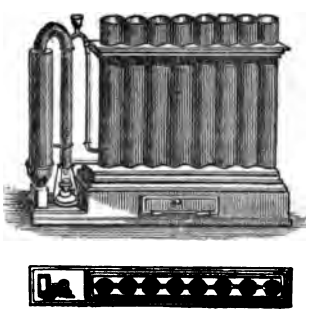


Fig. 2.

A HYGIENIC TOILET WATER.

Murray and Lanman's 'Florida Water' is a valuable antiseptic and hygienic perfume, introduced in the States about eighty years since, to supersede Eau de Cologne, and has supplanted the use of the Rhenish water, until it has become an universal perfume throughout the American Continent; and, in hot climates, its use in

the bath is now looked upon as a necessity, from its invigorating and refreshing properties. Its hygienic features have caused it to be recommended by medical authorities for invalids and persons of delicate sensitive organisations, while for the many uses to which Eau de Cologne is applied, Florida water will be found preferable. A simple floral extract, it is devoid of the oppressive sweetness attaching to many French and English scents, yet it is probably one of the most lasting as a handkerchief perfume, and most delicate and delicious. In the principal European cities, it is fast becoming as popular as in the United States, and has recently been introduced here by Messrs. Burroughs, Wellcome and Co., Snow Hill, E.C. From some knowledge of Florida water, we believe, when better known, it will become popular here, and we are free to endorse it.

GROOM'S REGISTERED MOP CASE.

MESSRS. GROOM AND COMPANY, Liquorpond Street, E.C., have introduced an article bearing the above name, to facilitate the twirling of mops when in use. Of late years the mop has not been so extensively used as formerly, but the now general adoption of tile and tesselated pavements for halls, and the flooring of large buildings, is likely to give it a new lease of life. To twirl a mop in a building in the ordinary way for the purpose of ridding it of an unnecessary amount of water is impossible without the liquid damaging walls or any articles that may be standing in the building in which it is used; but by Messrs. Groom's invention this is completely obviated. As our

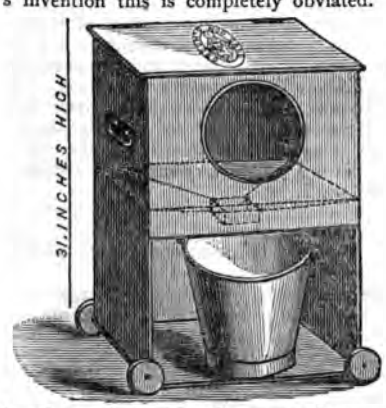


illustration shows, it consists of a square box running on wheels, although it may be easily carried by one person. It is made of strong tinned iron, and japanned inside and out. The mop is placed in the circular hole, the handle resting on the bottom, and in this position it is twirled, the water being caught in an inclined pan and passing through a hole into the pail underneath. For hospitals where diluted disinfectants are required to be spread rapidly over an extended area, this appliance should be most useful, as well as for ordinary cleaning purposes.

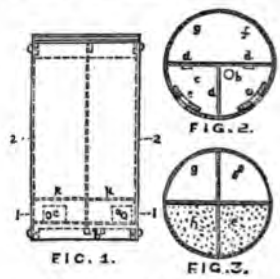
RIMMEL'S SICK ROOM APPLIANCES.

Several little sanitary and disinfecting appliances were shown at the Medical and Sanitary Exhibition by Mr. Eugene Rimmel of the Strand, grateful either to the inmates of the sick room or the convalescent. Amongst these was the 'Rafraichisseur', or scent diffuser, by means of which, Toilet Vinegar, Eau de Cologne, or similar matters, may be blown in a pulverised state over carpets, curtains, bedclothes, etc., to refresh and perfume the air. The Perfume Vaporiser, for rapidly diffusing the fragrance of flowers in apartments is a very pleasant addition to a sick room, and may be easily made useful by the employment of a disinfectant or a therapeutic agent if desired.

The Canterbury Sanitary Authority are about to appoint a Sanitary Inspector at the salary of £100 per annum. Intending applicants should apply to the Town Clerk.

ILLUSTRATED SANITARY PATENTS

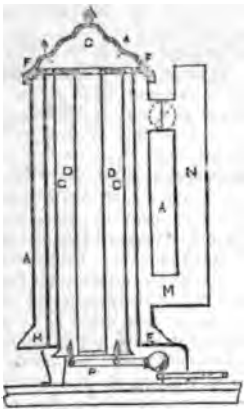
4861. (1880.) APPARATUS FOR FILTERING WATER. CHAS. GEORGE PFANDER, LONDON. [6d.]—This invention has for its object improvements in apparatus for filtering water for domestic use. The apparatus consists of metal case, by preference of cast-iron, galvanised and cylindrical form. It is set with the axis vertical, the low end is closed, and at the top there is a moveable cov which, when the filter is in use, is fixed on, and the whc apparatus is sufficiently strong to sustain the pressure which the water is supplied. Within the casing there a partitions; the partitions should be radial, and four is convenient number. The partitions divide the case in compartments, and the compartments are connected l passages alternately at the top and bottom, so that the wat which is admitted near the bottom of one compartment h to traverse the other compartments in succession. Th water ascends in the compartment it first enters, descend in the second, ascends in the third, and descends in th fourth compartment. If there be four compartments, the filtered water is drawn off from the bottom of the fourth. All of the compartments are charged with filtering material; the material which is considered best is of a carbonaceous



granular nature. Fig. 1 is a side elevation of a filter constructed according to this invention; Fig. 2 is a plan of the same, with the cover removed, the filter case is here shown empty; Fig. 2 is an horizontal section on the line 1, 1, in Fig. 1; Fig. 3 is a similar section on the line 2, 2, in Fig. 1. The filter here shown is of wrought iron galvanised, but cast iron is also a material which may be conveniently employed. *a* is the aperture in the side of the filter near the bottom, at which the inlet pipe is connected; *b* is the aperture at which the connection is made for drawing off unfiltered water (this, as will be seen, is at the bottom of the filter); *c* is the aperture where the tap is fixed for drawing filtered water.

4938. (1880.) GAS STOVE FOR HEATING AND VENTILATING: W. WYMAN, GLOUCESTER. [6d.]—The claims are registered as under:—1. The combination of four concentric metallic shells, so arranged as to form two chambers communicating with each other by means of one or more passages at their top, and with the outer air by means of two outlet tubes, connected by an intermediate flue. 2. The heating of these concentric shells so connected with one another by means of a tubular ring or other appropriate gas burner placed beneath them, so that the products of combustion shall be carried through the elongated metallic passage thus formed, whilst the outer air is brought into contact with the outer surface of such passage, and is thereby heated. 3. The provision of an alternative outlet for the heated products by means of a throttle valve inserted in the upper outlet from the outer of the two chambers, so that the whole, or a portion only, of the products of combustion may be allowed to pass into the outlet flue at a higher temperature than they would if they were compelled to pass out through the lower of the two outlets, and thus to enable the outgoing current to overcome resistance to wind pressure to which it may be exposed. 4. The combination of the foregoing elements of the said stove, in the manner and for the purposes hereinbefore described. The figure represents a section of this stove. A, B, C, and D are the

four concentric cylindrical shells, which are here shown connected together at the top by the metallic casting F (shown entire in Fig. 3), and at their bottom by the casting E. The space between A and B forms the outermost of the two chambers of the stove, which is closed at the top and bottom



by the two castings above mentioned; but is connected with the outlet flue N by the upper horizontal tube H, and the lower horizontal tube M. In H is seen the moveable throttle valve L. Between B and C is the space *a*, and inside D is the space *b*, both of them open at the top and bottom, so that air can have free access to them, and become heated by the surfaces of B and C with which it comes into contact. The space between shells C and D forms the innermost of the two chambers of the stove closed at the top by the casting F, in which are constructed the passages *k*, *k*, etc., by which the two chambers communicate with one another, and open at the bottom, so that the heated products of combustion from the jets *i*, *i*, of the ring burner P, will pass up into it when the latter is placed in position under it. In Fig. 1 this burner is represented as attached by a ball and socket joint to one of the feet of the stove, so that it can be moved in and out from beneath the stove for purposes of cleaning and lighting.

5102. (1880.) PIPE JOINTS: NICOLAS TALARD, PARIS. [6d.]—This invention has for its object to afford ready means for securing together the ends of pipes without the use of screw bolts or screw couplings, so that the joint may be rapidly and effectually connected and disconnected. For this purpose the ends of the pipes may either have sockets and spigots fitting into each other, or their end surfaces may merely butt against each other, suitable packing being provided between the meeting surfaces in either case

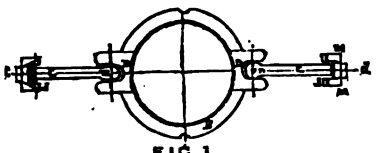


FIG. 1

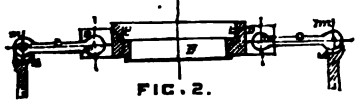


FIG. 2.

if necessary to make a tight joint. The end of the one pipe has lateral lugs, to which are pivotted links, the free ends of which have eccentrics or cams that can be turned by means of levers or keys. The end of the other pipe has projecting jaws, corresponding in position to the lugs on the other pipe, so that for making a joint between the two pipes their ends are brought together, and the said links of the one pipe are introduced between the jaws of the other, whereupon the eccentrics or cams are turned by their levers or keys, so as to press against the jaws with sufficient force to bring the two ends of the pipes tightly together, and thus to make a perfectly tight joint. By turning the cams or eccentrics in the contrary direction, the joint is as rapidly disconnected again. When the eccentrics are actuated by levers fixed thereto, the latter are so arranged that, when the eccentrics are tightened up for making the joint, the levers lie close against the sides of the pipe. The claims of the patentee are as under:—1. In a pipe joint, the combination of the links C, pivotted to the one half joint with the levers L, having cams M that are caused, by turning the levers, to bear upon the forks D^1 of the other half joint, so as to draw the two halves close together, substantially as herein described. 2. In a device for securing pipe joints the use of pivotted levers L, having cams M with flat faces, operating as herein described.

5164. (1880.) DRAIN-PIPES, ETC. EDWARD BROOKE, HUDDERSFIELD. [4d.]=These improvements consist in

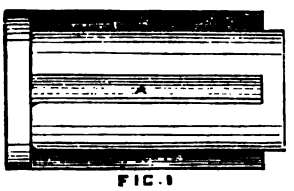


FIG. 1

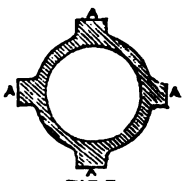


FIG. 2.

forming one or more horizontal ribs marked A, or bars on the outside of the cylindrical part of sanitary pipes, so that when the pipes are laid in the drain or opening they will rest true and form a solid bed of themselves. If preferred, the ribs may consist of corrugations formed longitudinally of the pipe. Also in the improvements in the means of forming the joints of such pipes, and this is accomplished by introducing on the spigot and in the socket of the pipes a preparation of cement or other suitable material (either in a liquid or other state) in the form of segments or parts of circles of the same radius or diameter of the pipe, so that when put together they will fit each other and form a permanent joint.

5215. (1880.) SEWERS AND DRAINS. WALTER EDIS, DOVER. [6d.]—The object of this invention is to prevent

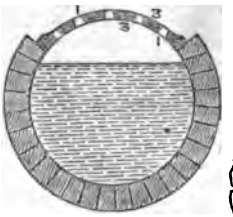


FIG. 1.

FIG. 2.

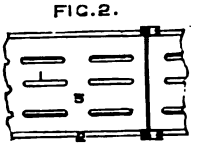
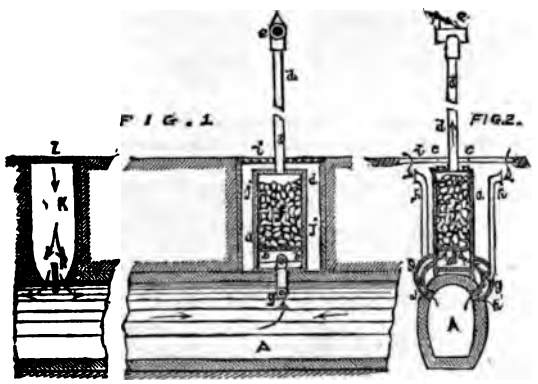


FIG. 3.

the accumulation of foul and poisonous gases within sewers and drains, by constructing sewers and drains in such a manner that the gases and injurious vapours, as soon as evolved from any decomposing organic and vegetable matters therein, will be allowed to escape through the tops of drain-pipes or the tops of sewers, and become deodorised by absorption in the earth or ground above. The gases thus formed within sewers and drains as at present constructed, being, as it were, hermetically bottled or sealed up, become surcharged, and while in this state they can only escape through the channels formed by ventilation-pipes and the rain-water pipes from roofs or other pipes that may be connected with the drains and sewers, and in this manner, foul and poisonous gases, which probably have been generated in a filthy sewer or drain some distance away from these channels, are emitted in volumes in an unfiltered state, producing the many evils complained of by medical men, whilst it is considered that if these gases had been allowed to escape as soon as developed they would have been innoxious. This invention, therefore, is intended to remedy

this evil by constructing sewers and drains with the upper parts of the sewer or drain pipes perforated with a series of apertures or holes. The perforations should be made twice as wide in the inside of the sewer or drain as on the outside, and they may be of any size, shape, or form, always providing that they must be smaller than the particles of the material to be used immediately over (as hereinafter described), but in no case, however small the pipes, should the perforations be less than half-an-inch wide on the outside.

5303. (1880.) VENTILATING SEWERS & DRAINS, &c. T. ROWAN, RYDE, ISLE OF WIGHT. [6d.]—This invention relates to an improved method of, and apparatus for, ventilating sewers and drains, and for treating the gases therefrom, the object of the invention being to provide means for causing the sewer gases to be drawn or forced through a suitable purifying medium, before being discharged into the open air. In carrying out his improvements he provides a receiver of suitable size and material. This receiver is provided with a perforated false bottom, and may or may not have a removable perforated tray or shelf near its upper end; the top of the receiver is provided with suitable charging openings for the purpose hereinafter described; from the top of the receiver passes a shaft having a suitable cap or cowl at the top, or provided with other means for producing an induced current. On the hereinbefore described perforated false bottom, is placed a quantity of suitable porous material, such as coke, which is saturated with carbolic acid or other suitable antiseptic or disinfecting material, which may be supplied through the hereinbefore described charging holes. From the receiver between the false and true bottoms thereof, pass a suitable number of pipes opening into the sewer or drain, and into the said pipes, where or near where they lead from the drain, open air injecting pipes having, if required, valves opening inwards. In some cases air may be forced into the



injecting pipes. A represents the sewer, F the coke or other material disinfected; C C the charging covers; D the shaft leading from the top of the receiver; H H the injecting air-pipes.

5306. (1880.) AUTOMATIC WATER-WASTE PREVENTER FOR WATER-CLOSETS: T. H. GOODSON, BERLIN. [6d.]—This invention relates to the application of a new or improved automatic apparatus to water-closets, for preventing the waste of water therein arising from carelessness, etc. It consists, firstly, in fixing between the supply pipe and the pipe leading to the closet basin, a valve-box containing two check valves, one above the other, the stem of the upper valve being enlarged at its upper portion so as to present a larger area than the valve. The outer end of this enlarged portion of the valve-stem works through a stuffing-box, and butts against the underside of the front part of the water-closet seat, which is movable. The lower check-valve is formed with a stem sliding in and guided by the upper valve stem. Between the two valve-seats is a pipe leading to within a short distance of the bottom of an air vessel. On a downward pressure being applied to the water-closet seat, the upper check valve is moved away from its seat and forces the lower valve on to its seat, or closes it so as to stop the passage of the water from supply-pipe to the closet basin, but at the same allowing it to enter the air vessel where it more or accumulates and compresses the air contained therein.

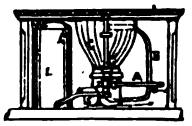


FIG. 1

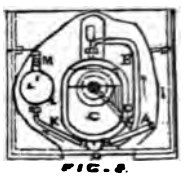
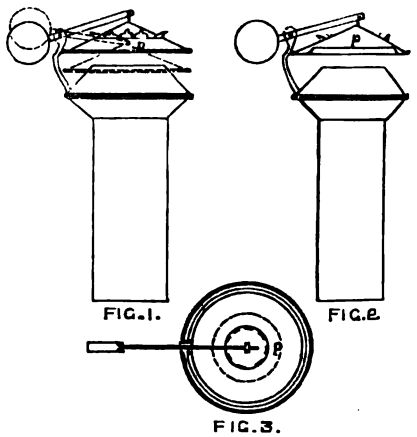


FIG. 2.

the pressure being removed from the water-closet seat, upper valve rises and closes the supply-pipe, when it the lower valve from its seat or opens it so that the pressed air forces the water contained in the air v through the open valve seat into the closet basin, whi thereby flushed. By this arrangement the lower val not allowed to open until the upper valve is closed, whe the danger of the latter remaining in an open positio not closing quickly enough, and thereby washing the w from the latter is avoided, and all concussion in the p prevented. A, supply-pipe; B, pipe leading to basin; valve-box; E, upper check valve; F, lower check val G, enlarged area of upper valve, E; L, air vessel.

5333. (1880.) IMPROVEMENTS IN VALVES, SHAF CAPS, COWLS, ETC., FOR VENTILATING PURPOSES: R. STEVENS, LEWISHAM, KENT. [10d.]—This is a va



minous specification, and we give one example which refers to improvements on his present manufactures. Referring now to the improvements in ventilators and chimney tops previously patented, Figs 1, 2, and 3 are elevation, vertical section, and plan of chimney top with improved balan cap or top *p* for the purpose of stopping down draught the shaft; the wind pressure being downward closes gap, which immediately returns to its open position on removal of the pressure.

5346. (1880.) WARMING AND VENTILATING RO JAS. SMITH, LIVERPOOL. [6d.]—This relates to warm and ventilating at the same time rooms and apartme dwelling-houses and other structures by open fire-grate accessories as hereafter described, the said open fire-g being suitable for coal, peat, and other heating agents especially so for anthracite and coke. On the accompan sheet of drawings, Fig 1 is a front elevation; Figs 2 a are sectional views. He prefers to use in carrying h provements into effect:—*a*, open fire-grate of ordinary struction; *b*, ash-pit closed by a tight fitting cover way or passage led from outside of building into them pit *b*; *c*, regulating valve or damper for controlling the of air from the passage *d* to the ash-pit. The wa passage *d* also extends to the air-chamber *f*, and I second regulating valve or damper *g* for controlling the of air to the said chamber; *h*, fire bars; *i*, perfo

amber *f*; *j*, cooking chamber at the back of the beneath the air chamber *f*; *k*, flue or chimney. ing valve is placed behind the grating *l*, for regu-

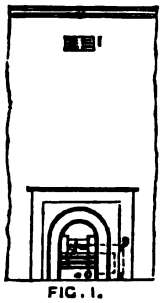


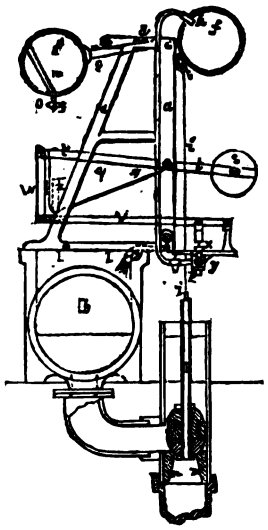
FIG. 1.

FIG. 2.

FIG. 3.

admission of fresh air. The grate shown is both anthracite and bituminous coal or combina- h. He has found in practice that a combination fuels answers well. When starting the fire, he coking chamber at the back of the grate with coal of the cheapest kind, small coal or slack suitable for that purpose.

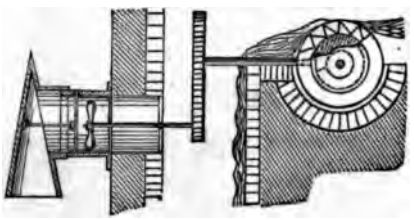
880.) WITHDRAWING AND RETURNING THE URINALS, CLOSETS, ETC.: J. REFFIT AND W. EDS. [6d.]—Fig. 1 is a side elevation and part



he first part of the invention refers to an t for withdrawing and returning the plugs of gh, and other closets at intervals for the purpose g the liquid, etc., contained in the receptacles reof to pass away into the drain, such apparatus sufficient time, and afterwards causing the plug hole, so as to allow the receptacle or basin to pplied with water. For this purpose they pro- mework *a*, which is attached to the trough or Within this framework *a* is mounted tube *c*, pro- the axle *d*, and fitted so as to work freely at *e*. remities of the tube are provided the hollow vessels *f* and f^1. These two receivers or vessels amunicate with each other through the tube *c*. mitted into the receivers or vessels *f* through or the elastic pipe *g*, and aperture *h*, and the eiver *f* is so arranged with regard to its level or e the receiver or vessel f^1, that the water after ein is discharged through the tube *c* into the er f^1, and fills it to the required extent; when overbalances, causing the filled receiver f^1 to the other receiver *f* to ascend; by so doing, a rotary motion is given to a quadrant or wheel on the axle *d*, to which the cord or chain *i* is attached, or a simple bracket *j* attached to the tube *c*, this in practice being found sufficient. The plug *k* is attached to the bracket *j* by the cord *i* through the medium of the tube *l*. By the movement of the bracket *f*, the plug *k* is withdrawn from the outlet *m*, and remains in that position. In order to let off the water which has caused the second receiver or vessel f^1 to fall, and to allow it to return again to its original position, they provide one or more syphons *n* in connection therewith; these are brought into action the moment the second receiver f^1 falls. The outflow from such syphons *n* may be regulated by suitable cocks *o*. These also determine the length of time that is to elapse before the plug *k* is returned to the outlet *m* for the purpose of closing it. The upward movement of the receiver or vessel f^1, and the closing or the return movement of the plug *k*, takes place immediately the vessel or receiver f^1 has been relieved of sufficient water to allow the vessel or receiver *f* to counterbalance and bring it back to its former position. As soon as the vessel or receiver f^1 has returned to the position shewn in Drawing, the filling operation commences, and the space of time occupied thereby may be regulated by a suitable stop cock *p*.

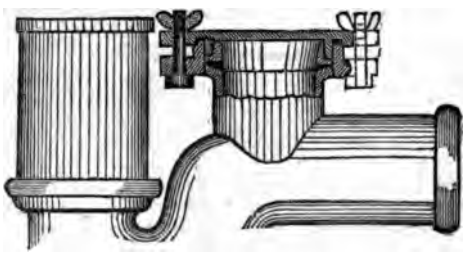
AMERICAN PATENTS.

239,418. SEWER VENTILATOR: GEO. W. ALEXANDER, BALTIMORE, MD., assignor of three-eighths to Clinton A. Wright, same place. Filed Jan 24, 1881. Issued March



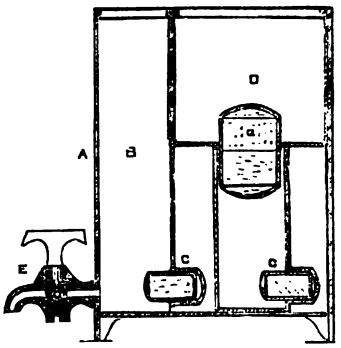
29, 1881. *Claim*—1. In combination with a motor located within the sewer and operated by the sewage, a current-inducing device, whereby the noxious gases are withdrawn from the sewer. 2. A sewer having a vertical gas-pipe with a shed-vane and a current-inducing mechanism, combined with an overshot-wheel and proper connecting devices, as and for the purposes specified.

239,741. STENCH-TRAP: PATRICK W. DOHERTY, BOSTON, MASS. Filed Jan. 20, 1881. Issued April 5, 1881.



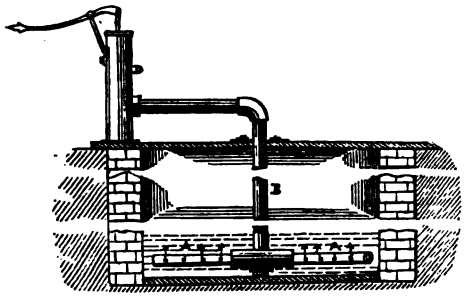
Claim—1. In a stench-trap, etc., an opening inwardly contracted, in combination with an inside separate and distinct wall and cover, each and all relatively constructed and arranged together to act upon any suitable compressible packing within said opening. 2. In a stench trap, etc., an opening inwardly contracted, in combination with an inside and separate and distinct wall and a cover having an inside flange, each and all relatively constructed and arranged together to act upon any suitable compressible packing within said opening. 3. In a stench-trap, etc., an opening inwardly contracted, in combination with an inside separate and distinct wall having a rib or flange and a cover, each and all relatively constructed and arranged together to act upon any suitable compressible packing within said opening substantially as and for the purpose described.

239,622. FILTER: BENJAMIN BEST, CINCINNATI, OHIO, assignor, by mesne assignments, to Sinclaire Rectifying Machine Company, New York, N. Y. Filed Feb. 17, 1881. Original No. 53,395, dated March 17, 1866.



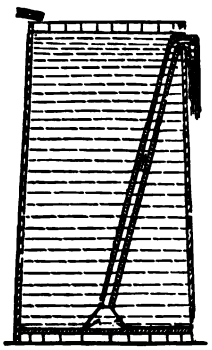
Issued March 29, 1881. *Claim.*—The combination of the sand-box D and filtering-box C, provided with sponge-tubes *a c* and c^1, with the vessels A and B, substantially as described.

240,813. WATER-PURIFYING APPARATUS: SIDNEY E. COLLINS, MARION, S. C. Filed September 17, 1880.



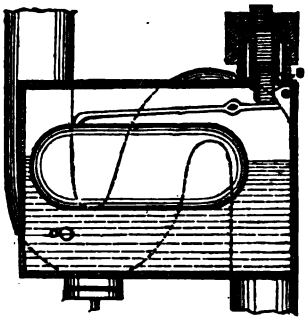
Issued May 3, 1881. *Claim.*—The combination of the horizontal perforated distributing-tube A, vertical supply-tube B, and air-forcing apparatus D, with a well or cistern, as and for the object stated.

240,908. DEVICE FOR REMOVING SEDIMENT FROM CISTERNS: JOHN H. KELLER, NEW ORLEANS, LA. Filed May 24, 1880. Issued May 3, 1881. *Claim*—1.



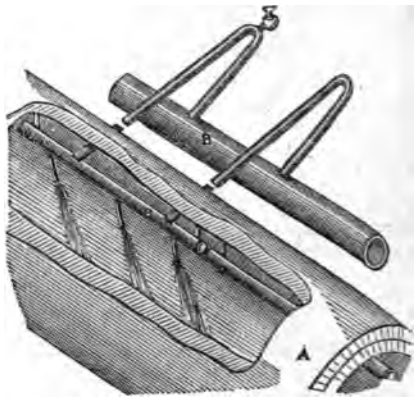
The combination, with a cistern, of a pipe having its lower end arranged near the bottom of the cistern, and its upper end near the top of the cistern, and extending outside of the same. 2. In combination with a cistern, a pipe having at its lower end a funnel arranged near the bottom of the cistern, and its upper end curved and located near the upper end of the cistern, and extending outside of the same, substantially as shown and described.

241,146. WASTE OR SEWER TRAP: COLIN LIGHTBODY, BROOKLYN, N. Y. Filed April 6, 1880. Issued May 10, 1881. *Claim*—1. A waste or sewer trap provided



with a water box or tank communicating with the interior or bend of the trap, and provided with a water-supply pipe and float-valve to maintain the trap-seal constant, or nearly so, as described, the said tank being inclosed exteriorly on all sides, whereby overflow or leakage therefrom is prevented in case of overflushing of the trap or waste-pipes. 2. The combination, with the waste or sewer trap having a water-inlet to restore the water-seal, as set forth, of the elastic thimble-valve *e*, controlling the discharge-orifice of said inlet, and a float operating said valve by the rise or fall of the water in the trap. 3. The combination, with a waste or sewer trap having a water-inlet to restore the water-seal, as set forth, of the two telescopic thimbles or valve-sections *e* e^1, controlling the discharge-orifice of the inlet, and a float acting to open or close said valve by the rise or fall of the water in the trap, substantially as herein specified.

240,655. FLUSHING AND CLEANING SEWERS: PETER BURKE, VIRGINIA CITY, NEV. Filed Aug. 26, 1880. (No model.) Issued April 19, 1881.—*Brief.* A series of water-pipes are suitably supported from the apex of the sewer, and provided with nozzles standing at an incline, so as to discharge jets of water into the deposit at the bottom of the sewer angularly. Said pipes are connected in sections with a main water-pipe, exterior to the sewer, and having cocks near the curb, so as to regulate the flow of



water. *Claim*—1. A pipe, B, provided with a series jets connected with the street water main and controlled a cock F, in combination with and inserted and support within a sewer-main, A, substantially as and for the purp described.

The death-rate of Dublin has fallen to 17 per 1000 pleasant record, when we remember it as high as 35 1000.

J. Comyns Leach, M.D., B.Sc., S.Sc.C. CAMB., been appointed Analyst for the Borough of Shaftesbury

IGINAL PAPERS.

REVELATIONS OF SANITARY SCIENCE.*

RD COOKWORTHY ROBINS, F.S.A., F.R.I.B.A.

ENT, LADIES, AND GENTLEMEN,

e to your invitation to address you on y subject during the continuance of this nceived and worthily executed Sanitary have chosen a title which is sufficiently e, viz., the Revelations of Sanitary ıe wide range of this comparatively ıce is too extensive to be particularly n in all its branches, and, consequently, t can be profitably undertaken in the hour's lecture is a general reference to particular description of a few.

ıat you will be addressed on successive listinguished men of science will render ıl for any one of them to wander very ı his own personal experience and spe-ge of the matter upon which he dis-, at the outset of this enquiry, I feel ice that the events of the last twelve been very encouraging to me, and to ans who, through good report and evil ersevered in their belief that the time hen the grave importance of the sub- more generally recognised, its revela-ıoroughly appreciated, and its objects ntly believed to be essential to the being. For example: In November ited by the Royal Institute of British read a paper on 'Sanitary Science in Civil Architecture'. The action of the is matter excited a considerable amount d was followed by three evenings' ani-sion; and, subsequently, the subject ted in the abstract and in detail, with orce, from every point of view, both by l by experts; while at other scientific erous papers have been read on sani-such as the following: 'The Sanitary Architect'; 'Sanitary Legislation'; an Increment of Value in House Pro-ıry Plumbing'; 'The Progress of Sani-c.; and even the ladies have had their mestic Economy Congress'. Finally, Committee of the Parkes Museum, ıge of the meeting in London of the Medical Congress, inaugurated and suc-ed through a Medical and Sanitary he South Kensington Museum, which by Earl Spencer, supported by two ters. As one of the Exhibition Com-e of the judges in the sanitary section, casion to refer to it again in the course s, and in illustration of some of the Sanitary Science.

ıot all. At the request of the Execu-e of the Parkes Museum, last winter, take part with Professor Corfield and eld, in the delivery of a series of lec-rsity College to the members of Build-

me, I met Professor Fleeming Jenkin, and the result of our conversation was the establishment in London of a 'Sanitary Protection Society', on the model of the society so successfully carried on by him in Edinburgh. Professor Huxley became President; and Professor Jenkin read a paper at the Society of Arts, which will be found to contain all the information required to enable similar organisations to be established elsewhere. This led to the formation of another association, called the 'Sanitary Assurance Society', in connection with which Professor de Chaumont read an admirable address at the London Institution. And lastly, showing the rapid growth of a good idea, when once it has been fully grasped, a third society has lately sprung into existence, in which Dr. Carpenter has taken a prominent part. This association, however, differs from the two former in being a trading company, who undertake, not only to advise, but also to execute the sanitary works required to be done—the philanthropic element being thus excluded which is the distinguishing peculiarity of the other two. All this is very encouraging, and is quite enough to put you at your ease, and to assure you of the highly fashionable character of the entertainment which brings us together—quite enough, too, to suggest that there is at least something to be revealed.

This spontaneous awakening to wants unfelt before is itself a revelation of the good sense of the people, the result of their realisation of the intimate connection existing between cause and effect in matters appertaining to health and disease. It is the ready response of the intelligent to the evidence adduced of the preventable nature of most of the diseases of old considered hereditary.

Facts are stubborn things; and the facts collated so voluminously have served to prove that, till within a comparatively brief period, the medical skill of the time was almost exclusively concerned in the cure of disease, rather than its *prevention*. This awakening of the professional conscience was not accomplished, however, till the frightful statistics of epidemics and plagues, the sickness of soldiers and sailors at home and at the seat of war, and at all public places of detention, led to official investigation of the causes of the evils experienced—when the death-rate from preventable sources of disease was found to be so great, that a crusade was set on foot, and a demand made for more healthful habitations, for pure air, pure water, unadulterated food, seasonable clothing, and personal cleanliness—as indispensable requisites to the preservation of good health.

Of all revelations, perhaps the most difficult of acceptance is that which carries with it the evidence of our own ignorance. Yet this is the invariable result of the study of sanitary science. Until lately, the scepticism was so great, that with the Prophet we might have cried 'Who hath believed our report?' Self-satisfaction and apathy in the masses is now, as it ever has been, a hindrance to progress in any new thing, the majority of the people resembling a certain Sir Joseph Porter, K.C.B., who 'never thought of thinking for himself at all'. Yet thoughtful persons have declined to recognise the facts adduced, preferring to see them by the light or shade of their own previously formed opinion, so that even the evidence was distorted by the kaleidoscope of personal preconceptions, which made charming pictures out of the elementary facts, which they declined to see in their own native ugliness. Thus the conservative *laissez faire* and the radical *non possumus* long held their sway; and nothing but Abraham Lincoln's 'pegging away' has ultimately caused the nether

vered at Eastbourne, on the occasion of the Sani-Wednesday, 24th August, 1881.

millstone to succumb to the abrasion of the dripping well.

By the title, 'Revelations of Sanitary Science', it will be obvious to all that I do not mean supernatural influences of unseen higher powers: no evil genius has to be propitiated except that which is already in subjection to our own intelligent will. But by that term I best express that knowledge which, being the result of the study of phenomena previously collected and arranged, comes as a revelation to those who have not so studied the subject of sanitation. In using the phrase 'Sanitary Science', I adopt the nomenclature of the subject now generally accepted, and perhaps as much entitled to be so called as is social science, biology, or political economy—which cannot yet be numbered among the exact sciences. Indeed, it must be confessed, as Dr. de Chaumont observes, 'that at present in sanitary matters we are working, to a great extent, not perhaps actually in the dark, but by the light of somewhat indifferent illumination, resembling, in some instances, that darkness visible which gives weird outlines to objects that would be ordinary and simple enough in the broad light of day; outlines that impress the visual faculties of different observers so variously, that each is apt to draw his own conclusion and treat with contumely that of his neighbour.' But whatever variety may exist in the different judgments of capable men, all concur in defining the objects of sanitary science to be the preservation of the health and the lengthening of the lives of our fellow men, and, as a consequence thereof, augmenting their happiness, increasing their productive powers, and diminishing waste.

The Revelations of Sanitary Science, then, open our eyes to the causes of the effects we suffer; and its good influence is limited only by the extent to which it is unknown. Half the population dies in childhood and chiefly from preventable causes, or lives in misery from ignorance of the predisposing causes of weakness surrounding them; and this not only from pollution of the elements, but from want of common sense and common courage in matters of dress and exercise, food and drink.

In the matter of *dress*, sanitary science reveals to us that æstheticism in attire is not beautiful if it seeks to disguise or to distort Nature's loveliness; if it is so disposed as to hinder the free exercise and healthful employment of every muscle and every limb; if it is so exacting that it impedes free breathing, walking, or running—whatever the sex. Skirts should be made the measure of the stride and length of the limb, and the grace of Grecian drapery should be as freely given to the waist as the skirt.

And if this is essential to the grown person, how much more is it necessary to the growing child? 'Prevention is better than cure' is an adage 'more honoured in the breach than the observance'. So common a thing as bandiness in children is preventable by good nursing. Is anything more brilliant than the beaming face of the child when first it finds the use of its feet. How cruel to delay the process by which its nature teaches it to exercise its powers, by hindering its activity for fear of consequences, which can only occur by withholding the means of its enjoyment. Yet the labour of sustaining a child, and helping it, by little and little, to attain the coveted prize of its first ambition, is shirked by the fashionable mother and the careless nurse, till its unhealthy weight (the result of insufficient exercise) brings about a danger which need never have existed. The need of good nursing in early life is the first of sanitary revelations, and the most in its good results.

'Scratch the green rind of the sapling, or rudely twist it in
And the gnarled and crooked oak shall tell of them for
to come.'

In the matter of recreative exercise and sustenance, sanitary science reveals the neces moderation in all things—in work, in play, i in drink. How impossible it is to be mod work in these exciting days is best known t who have made their mark, and know has cost them to do it. But though it is b die in harness than to live in a harem of p delights, it should be the aim of all to do but so to mingle both that they may make t productive use of their lives.

'Absence of occupation is not rest;
A mind quite vacant is a mind distrest.'

Intemperance in drinking has long since to be fashionable, but moderation in eating at intervals is as necessary to health as the forn these days of competitive examinations, suc pends very much upon the wisdom with wh means of life are adjusted to the ends; training necessary for athletes is quite as for students in high schools; and more freq stention from fashionable evening amusem favour of out-door exercise and natural enj

By the analysation of the Registrar-Gene turns, sanitary science has made very i revelations—as Dr. Carpenter quoted for upon which to discourse. The ancient mourned that the life of his contemporaries but threescore-and-ten, and if by reason of they attained fourscore, life was no longer What the average duration of life in those times may have been it is difficult to say; know that the average age at death throug United Kingdom is but 39 years. Dr. F shown 'that the nearer the people live toge shorter their lives', so that the aggregatio population in vast towns tends to reduce the in the absence of sanitary improvements to sate for it. The result of such improvem already made itself felt, however; and D Playfair has shown that the annual death London has gone on decreasing—so that before the great fire of London 80 perso annually out of every 1000, twenty years a fire it fell to 40 in the 1000. The mean rat last decade was 22.3 in 1000, and during the months it stood at 20 in 1000.

Macaulay tells us that 'the difference in s between London of the 19th and of the 17th c is far greater than the difference between L an ordinary season and London in the cholera. Then, men died faster in the pure try air than they now die in the pestilential our towns; and then men died faster in the our towns than they now die on the coast of This is encouraging to us.

'Surely,' says Mr. Collins, 'no better could be afforded of the blessings which science has accorded us, and no greater t medical skill than the fact that, guided by principles, diseases, which were ordinary are now only known and remarked by the quency, if not entirely extirpated—the sweat ness, the dancing, mewing, and biting ma black death, plague, and cholera are pr extinct; small-pox should be; and of a Richardson writes, "that, whilst the Met

once looked upon it as an ordinary dis-
s now so rare that a practitioner may live
nd never see it."'
ıg as such comparisons may be, it must
gotten how recently most of the exemptions
se which we enjoy have been achieved, and
has yet to be done in that direction, for
during the last ten years, the death-rate
reduced 5 per cent., or one-twentieth,
to the saving of some 300,000 lives (and
d Carrington thought a convincing proof
ern sanitary legislation had produced useful
tant effects'), yet it must not be forgotten
ır behind what has already been achieved
my, *per se*, in which, as its chief Medical
serves, instead of dying at thrice the rate
e population generally, as was the case not
s ago, the chances of the soldier's life are
s better than the civilian's during most of
that he serves wlth the colours. And the
n Her Majesty's gaols enjoy a still greater

ysley showed in his novel of *Two Years*
ocal self-government which we enjoy is a
good, if we are unimpressed with its
lity, and if our Parochial Authorities shirk
e and trouble which is necessary to accom-
ts equivalent to those effected in the Army.
s of Sanitary Surveyors and Medical Offi-
nspectors are commonly rendered nugatory
ving vestrymen.

the cholera of 1852-3 an opportunity
led me of creating a precedent for local
certion. I had studied the Blue Books of
al Board of Health, and the Reports of
wick, Dr. Sutherland, and others, and I
cepted the post of Honorary Architect and
to a self-established District Board of
St. Pancras, and in 1854 the report of our
gs was published and circulated under the
Practical View of the Sanitary Question.
ırt not only recorded what was done, but
ıs done, and served to show what might
ı done elsewhere. Besides the closing of
yards, 1,017 separate sources of infection
ished by the removal of cesspools, the
ınd trapping of drains and sinks, the
of refuse, and the lime-whiting of walls,
ı was the result of 2,500 inspections, and
s to nearly 100 landlords. Four thousand
of excrementitious matter were removed;
of foul house-drains were renewed or
etc., etc. And this was effected in one
total expense to the Board of but £140, in
vhich represented but the 280th part of the
s at that time. It is only fair to say, there-
had the same energy been shown through-
etropolis, 280 times the work might have
, which is as much as to say that 284,760
sources of infection might have been
; 1,000,000 cubic feet of fæcal matter might
ı removed; and 328 miles of foul house-
ght have been renewed or cleansed in a
r. Congratulate ourselves as we may, on
been done, and is doing, there is still a vast
ft undone, as this experience of now well
years ago will testify. And if we neglect
ot one class, but all classes, must suffer for
the late Dr. Cumming said, when advoca-
establishment of the, then, Metropolitan
ssociation: 'This was a question,' said he,
the members of every class were alike
deeply interested. It was a beautiful law which the Almighty had woven into the texture of his providence, that the man who lived for himself only lived to injure and destroy himself. He who ventures to twist a chain round the limb of a brother, must learn that the other end has twined around his own, and by the same analogy, he that connives at, and disregards the suffering, misery, and degradation of his neighbour, will not escape with impunity, for what he leaves to breed pestilence in the dark alley, will rise and reach him in the grand square, and show the rich that they are never safe as long as they neglect their duties to the poor. The sanitary question was only second to the educational; air, water, and cleanliness had much to do with the moral condition of our country.'

Let us now briefly refer to some of the more important principles which sanitary science teaches, premising that there are two distinct systems of sewer construction, broadly distinguished by the phrases, *sewers of deposit*, and *sewers of suspension*, both having reference to the water carriage of excrementitious matter. The former is adopted in many great towns, and does not necessarily provide for the immediate removal of the soil from houses, except in times of storm or very wet weather. At other times a system of flushing more or less intermittent is involved, owing to the absence of sufficient water for the carriage of the soil accumulations and refuse. The latter is adopted in some provincial towns, as Croydon, and requires the removal of the soil at once at all times of the year, or at least before the solid matters in suspension have had time to enter into that putrid state when sewage gases of a most deleterious character are generated within the sewer. Obviously, the former system is one which, by providing for occasional storm waters or heavy rains, over a large surface of land, as well as the ordinary house sewage, necessitates the construction of vast cavernous sewers, which in dry weather (from the absence of adequate rain-fall and sufficient flushing arrangements) constitute sewers of deposit, the emanations from which are often so deadly (owing to the insufficiency of ventilation) that disease and death are pent up within them, ready to find a way through every aperture into the dwellings of the rich and poor alike, so that the lives of the prince and the peasant are equally endangered by living in houses or hovels whose drains are in direct communication with the public sewer, unless those precautions are taken which it is the business of sanitary science to discover and to enforce. The latter system is one which provides a separate sewer for the storm waters, or leaves them to take care of themselves, and find their own way into the rivers and the sea, and thus necessitates the conduct of the house-drainage only in comparatively small pipes, the smallness of the bore concentrating the stream of water, which carries with it the soil held in suspension along the narrow channel provided.

Mr. Chadwick, in his recent pamphlet entitled *Circulation or Stagnation*, quotes the address of Mr. F. O. Ward at the Brussels Congress in 1856, on a system of sewerage involving the utilisation of the sewage by irrigation, briefly summarised in the following description of a sanitary Arcadia: 'The water which falls on the hills in a state of purity undergoes a natural process of filtration through sand, enters the rural collecting-pipes, and passing through the aqueduct to the metropolitan distribution pipes, finds its way to every story of every house in the town; when again, after having supplied the

wants of the inhabitants, it runs off, enriched with fertilising matter, which it carries away before allowing it time to ferment. This manure, driven along irrigation pipes, is deposited in the soil, leaving the water to pass into drainage-pipes, and flow on to the rivers. The rivers conduct it to the ocean, whence it rises as vapour under the heat of the sun, to redescend as rain on the hills, enters again the collection-pipes, and recommences its vast and useful course of circulation.'

In opening the discussion which followed the reading of my paper at the Royal Institute of British Architects, from which I have made the foregoing extracts, Dr. Corfield remarked: 'Mr. Robins has said that civil architecture can never be divorced from the experience of sanitary science. I would go farther than that, and would say, that if it were not for the experiments that have been made by scientific men, no alteration in principle would be carried out, not only in architecture, but in everything else. If it had not been for the chemist Pasteur, for instance, all the vine-growers in the world would never have discovered the cause of the destruction of their vines; the fowl-keeper would never have discovered the reason for the loss of hundreds of thousands of their poultry by chicken cholera; and the prevention of the silkworm-disease would have remained an unknown problem. And, "he asked", what is it that has caused us to think so much of sewer air? There is one reason, and only one, and that is, that it has been shown by scientific experiment—by the experiments of sanitary science—that enteric or typhoid fever is produced by a constituent of that air; yet the public mind was not aroused to the necessity of preventive measures until one or two members of the Royal Family suffered from that disease.'

Sanitary science has revealed to us, by the positive experiments of its professors, the necessity of devising means for the ventilation or disconnection of the house-drains from the main town-sewers, because it has been shown that foul gases will pass through water, that on one side of the water in a trap they are absorbed, and on the other side they are given out, and that this process goes on continually. And if this is the case, even when a house-drain is syphoned off by a water-trap, what must be the condition of those house-drains which are not trapped at all, but the sewer air is laid on by these to the interior of the dwelling through any untrapped sink or closet, or leaky joint; and which the use of disinfectants serves only to conceal from observation, and to hinder the perception of the cause.

Dr. Frankland's experiments have proved that when water contains foul matter decomposition takes place in the water, and the surrounding air is contaminated by the bubbles of gas generated, releasing the infectious particles along with it,* thus showing the desirability of intercepting man-holes to drains, even where water-traps exist, and dem ting the fatal consequences likely to ensu neither water-traps or man-holes exist, which theless, is still the case in the great maj dwelling-houses in the land. Thus, throu revelations of sanitary science, mechanical ap have been devised, like those exhibited u walls, by the aid of which it is now quite pos Dr. Corfield has proved, to put a house into condition of safety, that we can say with certainty that if typhoid poison is in the mai it will not get into the house; and further typhoid fever is taken into the house, wh preventive measures are taken, it will not Sanitary science having first revealed th absorption by water of bad gases, as alread tioned, mechanical means have been devi practical sanitarians to prevent the drinking- our cisterns and wells from becoming contan It is common to find wells situated so near t pools that the water of the former is rendered and poisonous by the percolations from th It is common to find the only supply-ciste over the closets, for the convenience of having boxes in the same for their supply; and the t overflow waste-pipe fixed in direct commu with the pan-closet or the soil-pipe.

Your Exhibition teems with devices for over these evils; pan-closets are condemned, val are admissible; service-boxes are discarde connecting waste-preventers are provided; th empty into the open air; and, as a rule, a s cistern for drinking-water is provided. I ha pended on the walls the illustrations of Mr. Teale's book entitled *Dangers to Health*, whi both amuse and instruct you; indeed I k better medium for opening the eyes of the mind to a right understanding of what to fe how to defend yourselves, than that very inte volume. I have also a drawing, to a large sca to me by Mr. E. F. Griffiths (an engineer w given special attention to this subject), whos but clear description thereof I cannot do bett quote:—

'It will of course be understood that these illustrat purely typical, and the conditions may vary greatly case which has to be dealt with. Fig. 1 illustrates a which the drains are all outside the house; a man- chamber is constructed in the line of drain, both purpose of obtaining easy access to drains in case of st and for providing an "air-break" or "disconnectio section of this man-hole is given, to a larger scale, F The syphon-trap fixed in the side of the man-hole sewer, prevents, as a general rule, the passage of se into the house-drain; but if by absorption, or otherwi gas does find its way into the man-hole, it is then so diluted that if it makes its escape through the ventil the man-hole (as may be possible in certain states atmosphere) it is quite harmless. Generally speaking, ever, there is a strong upward current of air in the drain, caused by the soil-pipe being carried full-size the roof, as shown, in which case the ventilating op to the man-holes serve as inlets for fresh air. Fi shows another and cheaper mode of making the "d nection" of the house-drain from the sewer. In this special syphon-trap is fixed (Buchan's), with a branch carried to the surface as a ventilator. The principle i cisely the same as in Fig. 1, and is equally efficient i respect, but if at any time it becomes necessary to ex the drain, the ground or pavement has to be opene Water-closets should always be situate against the ou'er if possible, and have a small ante-room (which may be as a lavatory) between them and the main part of the h

* Professor Frankland, in his paper *On the Transport of Solid and Liquid Particles in Sewer Gases*, read at the Royal Society (*Proceedings*, 1877, Vol. 25, p. 542), concludes with the following summary: 1. The moderate agitation of a liquid does not cause the suspension of liquid particles capable of transport by the circumambient air; and therefore the flow of fresh sewage through a properly constructed sewer is not likely to be attended by the suspension of zymotic matters in the air of the sewer. 2. The breaking of minute gas bubbles on the surface of a liquid, consequent upon the generation of gas within the body of the liquid, is a potent cause of the suspension of transportable liquid particles in the surrounding air: and therefore, when, through the stagnation of sewage or constructive defects, which allow of the retention of excrementitious matter for several days in the sewer, putrefaction sets in, and causes the generation of gases, the suspension of zymotic matters in the air of the sewer is extremely likely to occur. 3. It is therefore of the greatest importance to the health of towns, villages, and even isolated houses, that foul liquids should pass freely and quickly through sewers and drain-pipes, so as to secure their discharge from the sewerage-system before putrefaction sets in.

In a case where there are no windows near, it is sufficient to carry the soil-pipe just above the eaves-gutter. The closets themselves call for no special description, except that they should not have overflows, for two reasons, one being, that defects in the water-fittings are not so easily noticed, and the other, the danger of admitting foul air through the overflow-pipe. Instead of the overflows, a lead safe should be fixed, and in all cases the waste-pipe from these should be taken direct through the wall. Illustration No. 6 gives the method adopted for disconnecting sink-wastes. The section, Fig. IV, shows a scullery-sink in the ground-floor, and a housemaid's sink above. A plan of the scullery-sink is shown at Fig. VI; it is fitted with a trap, and the waste (usually two inches in diameter) is carried to discharge over a stoneware-gulley fixed outside. The housemaid's sink, Fig. V, if on the ground-floor, is dealt with in exactly the same way, but if on an upper floor, as shown, the waste is carried into a rain-waterhead, the down-spout from which discharges with a shoe at the foot over a similar gulley.'*

Dr. De Chaumont has said that parallel with the progress of medicine and the collateral sciences advances have been made in sanitary science which amount to important revelations, so that it has become possible to lay down certain principles, which, as we have seen, are capable of practical application to the great advantage of us all. Thus, the dwelling in marshy districts has been proved by *incontrovertible* evidence to be usually followed by attacks of ague and fever of various kinds; that destitution and crowding give rise to typhus; that the withdrawal of vegetable diet produces scurvy; that small-pox, measles, and scarlet fever are communicable by contact to otherwise healthy persons; and by *equally* strong evidence, though not so generally accepted, acknowledged, and acted upon, sanitary science reveals to us that out of the 700,000 deaths which take place in one year in the United Kingdom, no less than one-third, or some 240,000 deaths, have been traced to those particular diseases which are liable to be favoured or propagated by neglected house-sanitation. In fact, the highest medical and sanitary authorities have decided that by good sanitary appliances and surroundings, resulting in the maintenance of the purity of the air and water within and around our dwellings, typhoid fever, diphtheria, sore-throat, and cholera, might be rendered exceptional diseases, instead of being, as they now are, the fruitful causes of illness and death to the alarming extent these statistics attest.

Let us proceed to notice some further revelations of sanitary science. We have glanced at the cause and cure of defective house-drainage and water-supply; we will now refer to the nature of the subsoil. As I have said elsewhere, a damp site makes a damp house, not only by the surface dampness of the surrounding ground, but by the ground air, which forces the moisture under and into the house, drawn forward by the very means adopted for warming the interior, which, by lightening the weight of the internal air, makes a free passage for the heavier cold damp ground air in the direction of the least resistance.

There are two general divisions in classifying soils, the pervious and the impervious. *Pervious soils* are those like gravel, sand, and soft limestones, which allow of the free passage of water through them; and if there is nothing to obstruct its free passage and the level of the water in the ground is sufficiently deep, the upper surface upon which the house is built is always dry and healthy. If, however, the gravel has no deep outlet for the water which passes into it, owing to its being situated in a basin of impervious soil, so that the level of the water in the soil is brought very near the surface, then it is necessary to find an outlet for the accumulated water by artificial means, called land drainage.

Impervious soils are those chiefly composed of various clays, which do not allow the water to sink into their depths, but only suffer it to flow over their surface; and, consequently, the garden soil gets super-saturated, and if the land is level the water is long in getting away, and the evaporation of the moisture in and upon the soil produces a humid, damp atmosphere, very injurious to health, and requiring very careful surface drainage to overcome. The public roads, forecourts, and areas of town houses are, usually, well drained, so that less evil comes from this source in the front of such houses, as a rule; but the back gardens are commonly neglected, and the basements suffer in proportion. It is obviously important to look to the surface and subsoil drainage of the site of the house you inhabit. But this is not all. Suburban villas are not always built on natural soils at all. The brickmaker has sometimes preceded the builder on impervious soils, and the gravel and the sand merchant on pervious soils; and, to bring the land to one uniform level, the well-known notice-board has appeared, inscribed 'Rubbish may be shot here', which being interpreted means—'*The seeds of disease may be sown here.*'

The foregoing revelations of sanitary science have led me to cover the basement floor of my own and of my clients' houses with a solid and practically impervious flooring. Let me give you the prescription. Provide deal, pitch-pine, oak, or other wood blocks, 7 in. by 3½ in., by 2 in. thick; burnettise them, and lay them in herring-bone or other patterns, bedded in gauged lime and hair mortar (after first dipping each block half its thickness in hot pitch), the whole resting on a solid foundation of ground lime or cement concrete averaging 6 in. thick, the interstices of the blocks to be filled in with Portland cement powder swept over them, the surface to be then washed with water; which, setting the cement in the joints, makes a permanent floor, which may be polished, or ornamented by Mr. Webb's process exhibited in the Eastbourne Exhibition.

So far we have been considering the effect upon the health of the community of bad drainage and water-supply and damp subsoils. But when we have succeeded in ventilating our drains and water and subsoil *out* of our houses, instead of *into* them, we have next to consider how to maintain the purity of the air of the rooms we inhabit, and defile with our own breathing, our house warming and lighting, and cooking, etc. In this matter, also, sanitary science has made many revelations, of more or less gravity. The late Dr. Parkes has shown in great detail the various sources of impurity to which the air of enclosed spaces is subject, and the particular diseases to which such impurities give rise, under the title of *Ventilation*, a term which he restricts to 'the removal, by a stream of pure air, of the pulmonary and cutaneous exhalations of men, and of the products of the combustion of lights in ordinary dwellings; to which must be added, in hospitals, the additional effluvia which proceed from the persons and discharges of the sick. All other causes of impurity of air ought to be excluded by cleanliness,

* As Professor Kerr has shown, there is a still more comprehensive plan of disconnection by subways, which I have adopted in my own practice. The Museum of Building and Sanitary Appliances, 19, Maddox Street, for example.

proper removal of solid and fluid excreta, and attention to the condition of surrounding dwellings.'

To expound the revelations of sanitary science by which the above impurities are detected, measured, and overcome, is my next intention; and, having regard to the mixed nature of my audience, I will do so in as popular a manner as possible. It is usual to measure the impurity in the atmosphere by the proportion of carbonic acid it contains—not because this is the only, or even the chief, cause of its unhealthiness, but because the presence of carbonic acid is indicative of the proportional existence of other impurities, viz., foul organic matter and moisture; and also because the amount of carbonic acid can be accurately measured, therefore may be usefully taken as an index of impurity generally. The average amount of carbonic acid in the air outside of the house is four parts in 10,000 parts. When it reaches six parts in 10,000 inside, the room begins to be stuffy. Dr. de Chaumont has shown that about 3,000 cubic feet of fresh air per person per hour is necessary to preserve the air quite fresh. Practically, however, no more than 750 cubic feet per person per hour is attainable in this country without producing draughts.

As Dr. Corfield observes, 'The air in our houses is rendered impure in various ways, but chiefly by our respiration, and by the products of combustion that are allowed to escape into it from lights and fires. Thus, the air that we expire contains a certain quantity of foul or putrescent organic matter. It is charged with moisture, and contains about five per cent. less oxygen and nearly five per cent. more carbonic acid than the air we inspire. Add to this, that every foot of gas consumed is equal to the addition of one person's expiration, and the need of changing the air is quite obvious.'

This change of air can only be effected by the admission of fresh air and the concurrent abstraction of foul air. It is not enough to provide for the extraction of air, without providing for its incoming, because the effort of natural forces seeking equilibrium will cause the air to be drawn through every crevice in doors and windows, and even through solid walls and floor, creating currents of air *en route* to the motive power, viz., the partial vacuum which the fire in the grate produces. Neither is it sufficient to provide for the admission of air, if there is no means of outlet; and if the chimney flue is closed it will not enter of itself at all, but will require to be forced into the room, by which process the occupants of the apartment will feel no more delightful sensation than is experienced by a descent in the diving bell at the Polytechnic.

In ordinary houses the chimney is a sufficient ventilator, when associated with a means of feeding the chimney with a supply of air, to prevent its feeding itself by drawing from every crevice as aforementioned. To feed the fire directly, however, would probably prevent draughts, but it would decrease the warmth, and leave the room unrefreshed by the change of fresh for expired air. Consequently, it is obviously desirable to introduce the air in such a way that it may do all the good it can, before it reaches the fire and is swallowed up by the chimney current. Now, it has been proved by experiment that the ordinary current up the flue of a sitting-room fire-place is at the rate of from three to six cubic feet per second, or 300 cubic feet per minute, or 18,000 cubic feet per hour. Consequently, allowing 1,000 cubic feet of air per hour as necessary to be extracted for each occupant of any chamber, obviously one sitting-room fire-place flue is a sufficient extractor for 18 persons. If 3,000 cubic feet per hour per person is insisted on, as recommended by Dr. de Chaumont, then six persons are efficiently provided for by this means, which is all-sufficient for practical purposes in dwelling-houses, except in the reception rooms on party nights; when a much larger volume of expired air will require to be extracted, to make way for the equivalent of fresh air which it is necessary to introduce to keep up the interchange, and to maintain the purity of the air generally. In winter this fresh air is warmed in its passage.

The foregoing principles underlie the best of the mechanical appliances constructed for the ventilation of dwelling-houses: and, proceeding upon these lines, Mr. Tobin has the credit of reviving an old principle laid down by Mr. Whitehurst, F.R.S., and published in 1794; and of putting it into practical use most successfully at the Ophthalmic Ward of St. George's Hospital, which is a room about 20 feet square by 14 feet high. Mr. Tobin closed all extract ventilators except the open fire-place, which it is necessary to keep going winter and summer, and day and night, to maintain the velocity of the upward current in the chimney, which was thus retained as the only and sufficient extractor. He next provided some eight or ten semicircular zinc shafts, about five or six inches in diameter and four or five feet high, and fixed them at the four corners of the room, and equidistantly between them. These shafts are connected at the feet with horizontal channels leading through the thickness of the walls to the outer air, and form the fresh air inlets; one set of shafts being in communication with channels leading to the outer wall gratings fixed on one side of the building, and one set of shafts communicating in a similar manner to gratings on the opposite side of the building. This was an after-thought, for when all the shafts communicated with the outer walls on one side of the building only, the room was either supplied with too little or too much air, just as the direction of the wind might happen to be towards or away from the said air inlet gratings.

In this way the fresh air was introduced and the foul air extracted: no draught was felt by the patients, much less by myself and other professional visitors, who congregated round the fire, expecting such a result. In fact, the prophecy of Mr. Whitehurst, delivered 100 years before, was fulfilled—that 'Given an air duct about three or four feet long and five or six inches diameter, fixed in either corner of the room most remote from the fire, and communicating with the external air, the incoming air will rise in a perpendicular direction to the ceiling, and being gradually diffused will soon acquire the temperature of the room; no person will be sensible of it, and the flame of a candle will not be in the least disturbed by it.'

The Sanitary Engineering and Ventilation Company have done their best to improve upon this suggestion, and at the International Medical and Sanitary Exhibition at South Kensington their various models were exhibited, showing how the blacks and dust may be intercepted in the passage of the outer air into the interior of the building; and your Exhibition also furnishes examples.

The introduction of fresh air is specially provided for in a variety of stove grates, and notably by the Hygiastic School Board Stove. Under the hearth, and through the gills at the back of the grate, the fresh air passes, and is warmed in winter by

rs the room through the gratings in front of ve, which are proportioned to the size of the which they are fixed for both warming and ven- purposes. Mr. Boyd does not consider the ey a sufficient extractor, but always recom- extract ventilators to be used with his stoves, t the foot of an air flue built in the upper part wall opposite the stove, with not only a means ning and closing the same, but also of heating ract flue by a Bunsen gas burner, as a means fying the air in the shaft and increasing the draught. If the objection is made that by g extract flues you will materially increase the f the building by doubling the width of the ey breasts and stacks, I answer, 'No! if you lling to do as I did thirty years ago, at Mr. suggestion.' Instead of making the withe, sion between the flues, of solid half brickwork, it a hollow flue by the introduction of cast-iron ates the thickness of a slate, leaving a clear es by 9 or 14 inches, as the case may be, for a ting flue, warmed on either side by the smoke etween which it is situated, occupying no more than the ordinary flue withe, and delivering e open air three feet below the smoke flues, h louvred openings.

sanitary science teaches us to regard ventila- something more than this; it has revealed to t ventilation cannot be rightly studied and ied without due consideration of the mode of g and lighting intended to be adopted in the to be ventilated. Indeed, the temperature of within a room, and without it, being different sity, in proportion that either is hotter or colder he other, is one cause of the pressure of one phere against another in search of that equi- n which nature is ever seeking and never find- r any length of time together. The whistling ushing through the woods and forests bloweth it listeth; we hear the sound of it, but cannot ecisely whence it cometh or whither it goeth, we have traced to its source the provocative of its movement, which will be found to arise variations in humidity, temperature, and conse- density, and pressure of the heavier against hter and brighter atmospheres, with which the r impinges upon the latter. Thus the draughts om are the result of the pressure of the cold air e street or passage, in its struggle to get to arm air of the room, and particularly that f it from which the heat is generated and ted.

en two rooms are of the same temperature the stagnant, that is to say, no movement of the m one to the other will take place by the g of a means of communication between them. obvious, therefore, that if the whole of the r of a house were equally warmed, without the ion of inlets for fresh, and outlets for foul air, would be no change of air from one part of the to another. But each room might be separately l, warmed, and ventilated by inlets and outlets, t the same temperature might be maintained, th this difference, that there would be no stag- , but pure fresh air, warmed as it entered for spiration, and withdrawn, as by expiration or stion it became impure. In the ventilation arming of the house, the hall and staircase not be forgotten. The best salvation from steful consumption of fuel is the withdrawal of use of the draughtiness of rooms, when the opened, arising from the difference in tem- perature between the sitting-room and the hall, by the introduction of a good hall-fire, or other system of warming the entrance-hall and staircase.

With reference to the lighting of rooms, of course the softest and most agreeable method is by wax candles, but the cheapness and brilliancy of gas, and its easy application, has led to its general adoption, regardless of sanitary consequences. For as Dr. Corfield observes in his Cantor Lectures: 'Candles, lamps, and gas, all help to render the air impure.' It is calculated that two sperm candles, or one good oil lamp, render the air about as impure as one man's respiration does, whereas one gas burner will consume as much oxygen, and give out as much carbonic acid as five or six men, or even more. This is why it is commonly considered that gas is more injurious than lamps and candles, and so it is, when the quantities of light are not compared; but with the same quantity of light, gas renders the air of a room less impure than either lamps or candles. Common sense at once suggests that the products of combustion should be carried away, and the heat generated by the process should be utilised to expedite its removal, and several manufacturers have turned their attention to this desirable end; and at the International Medical and Sanitary Exhibition, and at your own Exhibition in this town of Eastbourne, examples may be found of many means to attain this end. Strode's sun-burners, Benham's globe-light, Faraday's pendants, and many more appliances, all seek to give practical application to the principles above referred to.

But we are fast arriving at the best solution of this difficulty, through the agency of electricity. The sanitary side of this new lighting power is to us the most interesting. By the Lane Fox and Swan incandescent lights, unequalled brilliancy, steadiness, and continuity of light is capable of being maintained, and this all produced within a vacuum formed within the globe of glass in which the light is produced; and consequently, by the use of these lights (which are becoming more common every day, and will soon supersede gas altogether), no heat is generated, no dirt is caused, and no products of combustion mingle with the air of the room, from which no provision needs to be made in its ventilation for this system of lighting, which, as hereinbefore explained, is so necessary in the case of other lights.

This brief review of the revelations of sanitary science would not be complete without a few words on heating. The natural process by which the temperature of the air is raised, is either by radiation or conduction. Conduction, or rather conducted heat, is the warmth given off to the air by heated surfaces brought into immediate contact therewith. Such heat in the ordinary fire-place is carried up the chimney; and the systems in use for generating it are known as hot-air stoves or flues; hot water carried in cast-iron pipes at low pressure, or in wrought-iron pipes at high pressure; and steam-pipe apparatus. Radiated heat is like that of the sun, which passes through the air as light, without heating it, into the earth or any intervening substance, from which the heat is given off gradually to the atmosphere creating the difference between sun and shade temperature. Thus it is that the conducted heat of an open fire goes up the chimney, as I have said, and about a sixth part only is radiated into the room, passing through the air without sensibly heating it, but warming the first obstacle to its progress, such as the enclosing walls and furniture, by which the radiated heat is given off to the air of the room, raising its temperature as required. It cannot be

called an economical mode of heating, being but one-sixth of the mean to the end, but it is the most enjoyable, and the most healthy. All the products of combustion pass up the chimney, and draw after them the impurities and denser air of the room lying lowest, while the vivifying rays of the crackling fire, heat, without scorching, the surfaces that warm the air of the room insensibly.

The primary, but not the exclusive object in the improvement of an open fire-stove, must obviously be the increase of its radiating power by reflection from heated polished surfaces in close contact with the fire, and this is done by many of the best stoves; one of the latest of which is Messrs. Comyn, Ching, and Co.'s new stove called 'The Paramount'. In this case the fire-basket or grate is quite disconnected from the brickwork surrounding it, and equally so from the metal case, excepting at the point of contact with the bracket which sustains the circular grate; thus the fire is enabled to radiate as from a centre all round. The rays of heat emitted from the back and sides of the fire-basket impinging on the metal-reflector of the back and sides, are reflected forward into the room, and utilised, instead of being lost as before. The secondary object, economy in fuel, is attained by the first, and by bringing in conducted heat from chambers provided at the back of the grate; and the third is the consumption of smoke. This has occupied a great deal of attention of late, with the object of purifying the air of blacks, and the reduction of London fogs. An Exhibition of stoves designed with this object will take place in London in October, and we shall soon see with what result. In the mean time, 'The Wonderful Grate', exhibited by Messrs. Smith and Co. at the London Sanitary Exhibition, accomplishes a great deal in this direction. It is an open fire-grate, and yet it consumes its own smoke; it burns anthracite coal; it is fed with fuel in the morning, and needs no attention till night, until the fuel is consumed; it requires no stoking, yet has always a clear bright red fire, the radiating power of which is considerable. Then there is Dr. Siemens' grate, which is an attempt to combine gas with anthracite coal; and a host of others.

The history of the heating and ventilation of the British House of Commons, both old and new, is perhaps as instructive a lesson in this branch of sanitary science as any which could be named. Sir Christopher Wren, Captain Cook, Sir Humphrey Davy, The Marquis de Chaubannes, and many others, tried their hands at the old building; Dr. Reid, Mr. Gurney, and the present Dr. Percy, have had their way with the new. However, it is not my intention to refer to public buildings to-night, but only to draw attention to the importance of the principles laid down by sanitary science which are applicable to all house-holders, and the revelations of which I have now traced as they have influenced house-drainage, and the ventilation of the same; house-warming and lighting; and the ventilation of the rooms in which we live and move, and have our being.

Mr. President, Ladies, and Gentlemen,—I beg to thank you for your kind and patient attention, and I trust I have not wearied you with too much speaking. To make a selection of the numerous topics which invited attention was not easy; but I hope I have said enough to justify the title of my paper, and to recommend to your continued study the principles of sanitary science, and their application to mechanical appliances which have for their object the improvement of the health of the community. If I have made no new revelations, I have at least endeavoured to popularise the old; and I think we may look forward, with confidence, as the result of such exhibitions as that which you have inaugurated in this town, that their need will become less and less, as time advances, knowledge increases, and the evidence of the value of these revelations accumulates. It is a work of 'sweetness and light'. It aims to realise that which hitherto has existed more in the imagination of the poet than in fact, 'Home, *sweet* Home'.

MEMORANDUM ON THE EFFICACY OF VACCINATION AND RE-VACCINATION.

By DR. J. W. TRIPE,
President of the Society of Medical Officers of Health.

IN considering the efficacy of vaccination and re-vaccination, it must be borne in mind that it is probable that at least 95 per cent. of the population have either been vaccinated or had small-pox, and that therefore there are less than 5 per cent. who have not been vaccinated or suffered from small-pox. In 1877, only 3.69 per cent. of the recruits for the Army and Navy had neither vaccination nor small-pox marks, thus affording strong corroboration of the above-mentioned estimate.

To show the contrast between the mortality from small-pox before vaccination was introduced, I submit the following for consideration. During the seven years, 1629-35, the annual death-rate in London was 189 per 100,000 population: in the 20 years, 1660-79 it reached the high figure of 417 per 100,000; whilst in the 30 years, 1728-57, it had increased to 426. During the ten years, 1771-80, just a century before the decennial period, 1871-80, the disease caused a mortality of 502 deaths per 100,000 population, or more than 15 times as many as for the period 1839-72, and 11 times as many as in 1871-80, when, under the influence of two severe epidemics, it caused 46 deaths a year per 100,000 population. I would also mention that during the years, 1681-90, and 1746-55, small-pox caused one-twelfth of the total number of deaths from all causes.

As the figures just given refer to periods during which vaccination was not practised, it may be as well to give similar returns for late years. During the 34 years, 1839-72, which I consider to constitute a greater wave-period of small-pox, there were rather less than 40 deaths per annum to each 100,000 population in London, against 502 in 1771-80. In the periods 1853-56, the annual death-rate was 2[illegible] 1859-60, 22; in 1861-63, 29; in 1864-67, 32; in 72, 71; in 1873-78, 23; and in 1879-80, 13 per 1[illegible] population in London. As the population of L[illegible] is enormously larger now than in the 17th and centuries, and as, *pro rata* to population, infec[illegible] diseases are usually more fatal amongst large small communities, we should have expected death-rate from small-pox to have increased the present time, as it did between 1629-35 1771-80, instead of showing the great decrease mentioned; and I therefore attribute this ch[illegible] chiefly to vaccination.

If from simple death-rates we pass on to cons[illegible] the relative mortality amongst vaccinated and vaccinated persons, and the proportion which unvaccinated cases bear to the vaccinated, obtain the strongest evidence in favour of vac[illegible] tion. During the 8 years, 1871-78, there were mitted into the Small-Pox Hospital at Hom[illegible]

ses; of these, 1,626 bore one or more good
2,657 had only imperfect marks, and in 793
there was no evidence of vaccination,
1 the patients stated that they had been
ed. There were also 1,477 unvaccinated
admitted. Now as before stated, there are
y only about 5 per cent. of the population
e not had small-pox or who are unvaccinated,
he proportion of unvaccinated persons ad-
was above 22 per cent. of the whole, it is
e quite clear, when the number from whom
iccinated were drawn is taken into consider-
at the unvaccinated are far more susceptible
-pox than the vaccinated. The death-rates
admitted are less liable to dispute, as (*a*)
those having good marks, the death-rate
3.32 per cent.; (*b*) of those having indifferent
he death-rate was 11.10 per cent.; (*c*) whilst
who stated that they had been vaccinated,
vhom no marks could be found, the death-
as high as 27.23 per cent.; and lastly,
the unvaccinated, the death-rate reached
mous figure of 45.76 per cent. The expe-
erived from this hospital is borne out by that
from other hospitals. There is also another
iece of evidence afforded by hospitals, viz.,
attendants when re-vaccinated never caught
ise, whilst a few who escaped re-vaccination
ed it. It has been objected that, if vaccina-
rds so great a protection against small-pox,
t that so many vaccinated persons take the

The answer is readily given: (*a*) before
almost usual custom of arm to arm vacci-
as generally carried out, there was very much
ination, and persons were consequently im-
protected; (*b*) because the number of inser-
lymph are often too few; (*c*) because expe-
f late epidemics has shown that early re-
ion is necessary, in consequence of the pro-
power of the lymph wearing out during
and (*d*) because re-vaccination is compara-
irely practised, although experience shows
ions properly re-vaccinated after the cessation
h, rarely contract small-pox, and if they do,
nvariably suffer only from a very slight form
sease.

ards re-vaccination, the experience derived
uiries made respecting the patients reported
partment, shows that a very large number
ated children take small-pox between the
and 10 years, and a greater number between
; as many as 30 per cent. of all the vacci-
es of small-pox having occurred in children
years of age. It is therefore evident that
ssary for re-vaccination to be performed as
years of age, unless the child be protected
good marks. One great obstacle to early
ation is, that the public vaccinators are not
of the public funds for re-vaccination under
of age, except during an epidemic, when the
be altered to 12 years by a Special Order
il.

lowing table shows the number of small-
which occurred amongst vaccinated persons
ey during eight months of the epidemic of
nd the percentage of cases at different ages
red with population. It will be seen that
vears of age the percentage of population
than double the percentage of cases; that
and 10 years of age the percentages were
ial, the excess being with the population;
tween 10 and 15 years of age, and especially
between 15 and 25 years, there was a much greater percentage of cases of small-pox than of population. Also, that between 25 and 45 years of age the rates were the same. It is therefore evident that as age advanced the protection afforded by vaccination became diminished until 35 or 40 years of age was reached, when, as shown by the comparatively small proportion above 45 years of age, the susceptibility to small-pox becomes much lessened and the necessity for re-vaccination correspondingly diminished.

Cases of Small-pox in Hackney at different ages among the Vaccinated.

Ages..	0 — 1	1 — 5	5 — 10	10 — 15	15 — 25	25 — 45	45 and upwards
Number of Cases	1	37	59	98	213	164	30
Percentage of population living in 1871	12.9		11.6	10.0	20.4	27.3	18.3
Percentage of Cases	6.3		9.8	16.3	35.4	27.2	5.0

The efficacy of efficient re-vaccination is shown not only by the statistics of Small-Pox Hospitals, but in other ways. Thus, in 1878, there were but 9 cases of small-pox in the whole of the British Navy, numbering about 46,000 men, and all these cases were mild, none being fatal. The naval instructions are that all men, who have not been re-vaccinated after entering the service, shall be re-vaccinated as soon after 18 years of age as possible, notwithstanding that they may have good marks, or have had small-pox. Dr. Walter Lewis, chief Medical Officer to the General Post Office, also states that during the 10 years, 1870-79, there was not a single death from small-pox, and only 10 slight cases amongst an average of 10,504 persons employed; whilst in the Telegraph Department, 12 cases occurred in the same period, amongst an average of 1,458 persons. All the Post Office employées were re-vaccinated on admission, unless the operation had been performed within 7 years; whilst the rule was not so strictly observed as regards the Telegraph staff. During the 18 years, 1859-76, the mortality from small-pox amongst the troops stationed at home was about 1 per annum amongst each 18,000 soldiers. There is one point in connection with re-vaccination that is often lost sight of, viz., that susceptibility to the action of the lymph varies in the same person at different periods of life, so that non-success of re-vaccination, say at 20, does not prove that the operation will not succeed at 30 or 40. This renewed susceptibility to vaccination corresponds to the renewed susceptibility to small-pox after an individual has suffered from an attack of this disease, and probably occurs in about the same ratio amongst both these classes.

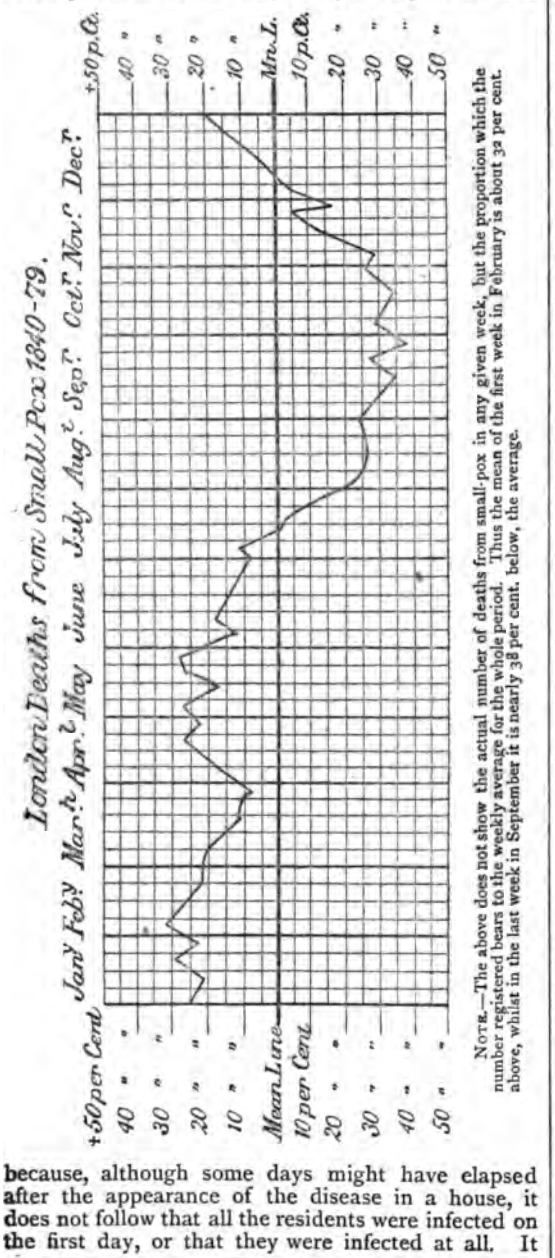
In concluding this part of my subject, I propose submitting the most important facts, as regards the mortality from small-pox, in a tabular form.

London.—Annual number of Deaths from Small-Pox, per 100,000 inhabitants.

7 years, 1629-35	189
20 years, 1660-79	417
30 years, 1728-57	426
10 years, 1771-80	502
10 years, 1871-80	46
8 years, 1873-80	17
33 years, 1839-72	40

An important matter, little understood by the public, is the number of days, after exposure to small-pox, when vaccination will either prevent or modify the disease. As the incubative stage of small-pox, that is to say, the period during which the disease does not ordinarily produce constitutional symptoms, is about 12 days, it follows that 'suppose an un-

vaccinated person should inhale the germ of small-pox on a Monday, if he be vaccinated as late as the following Wednesday, the vaccination will be in time to prevent the disease being developed: if it be put off until the Thursday, the small-pox will appear, but be modified; but if it be delayed until the Friday, the vaccination will be of no use.'* The same applies to re-vaccination, so that if a person should unfortunately be exposed to the infection of small-pox, he should be vaccinated as quickly as possible. If a case occur in a house, all the unvaccinated and those above 7 years who have not been successfully re-vaccinated, should have the slight operation performed forthwith; for even if too late to prevent the development of the disease, it may modify the attack;


London Deaths from Small Pox 1840-79.
Jan.y Feb.y Mar.h Apr.l May June July Aug.t Sep.r Oct.r Nov.r Dec.r
+50 p.C.
40
30
20
10
Mn.L.
10 p.C.
20
30
40
50
+50 per Cent.
40
30
20
10
Mean Line
10 per Cent.
20
30
40
50
Note.—The above does not show the actual number of deaths from small-pox in any given week, but the proportion which the number registered bears to the weekly average for the whole period. Thus the mean of the first week in February is about 32 per cent. above, whilst in the last week in September it is nearly 38 per cent. below, the average.

because, although some days might have elapsed after the appearance of the disease in a house, it does not follow that all the residents were infected on the first day, or that they were infected at all. It must not, however, be supposed that the incu period of small-pox is always 12 days, becau sometimes a day or two greater or less tha period.

In concluding, I think it will be useful to ap diagram, reproduced on a somewhat larger scal the Registrar-General's Report, 1881, of the from this disease in London during the 40 ending December 31st, 1879. It does not sh absolute number of deaths in any given we that small-pox causes a number of deaths in of the mean, from the second week in Decen the second week in July, and that the average rate from this disease is below the mean fr early part of the second week in July to the week in December. Also that the greatest r of deaths occurs during the third week in Janu the first of February, and that after a fall, unt the end of March, it rises again to the end third week in April, and remains at a high with a temporary fall, up to the last week ir At the commencement of an epidemic, the ris continues later than the end of May, and the decline does not occur until the middle of Ju even a little later. The period, however, considerably, as in 1871 the greatest numl deaths occurred in the eighteenth week, and fore it is not to be assumed that the curve des by the deaths during a large number of years which will occur in any given year.

The admissions into the Small-Pox Hos correspond pretty closely with the deaths, that, as might be expected, the curve rises abo mean line in November instead of December the curves are more irregular, owing to the sho of the period during which these hospitals have open. I have not therefore reproduced the dia of the cases of small-pox from the Registrar-Gen Report, as I have of the deaths. I would mention that the curve described by the deaths small-pox in New York much resembles tha London, but is more smooth, the rise in January February being continuous up to the middle of month, and then declining to the middle of Ma rising again gradually to the middle of May, then falling regularly, but sharply, to the end September. The rise in May is higher, being ne 70 per cent. above the mean, against 28 for Lond and the depression is also nearly 70 per cent. bel the mean, against 38 for London.

FILTRATION OF AIR.

By Bernard Dyer, F.C.S., F.I.C.,
Member of the Society of Public Analysts.

Some time since I was requested by Mr. Fran Lloyd, of 40, Mecklenburgh Square, W., to exam a wire-gauze screen, which was in use as an air-fi in a simple room-ventilating apparatus of Mr. Lloy own device. The apparatus, of which I shall sp presently, is so arranged that practically the wh of the air passing into each room is drawn thro screens of copper wire-gauze; an external screen, arrest coarse 'blacks' or particles of soot,—and inner screen, of the same material, only very m finer, numbering about 90 meshes per linear inc 8,100 meshes per square inch of surface. The scr themselves have a surface of rather more th square foot, and the quantity of air drawn thr them is approximately estimated by Mr. Lloyd, the aid of an anemometer, at from 30 to 70

* Marson on Small-Pox, in Reynold's *System of Medicine*, vol. i.

feet per minute. In foggy or dull weather the finer screens require very frequent cleansing, or they become practically impermeable to an atmospheric draught, and even in bright weather they require to be frequently removed and cleansed.

The screen that I examined had been exposed for 55 consecutive hours. For 31 hours a fire had been burning, during which time Mr. Lloyd estimated the passage of air at 66 cubic feet per minute; while for the remaining 24 hours, during which there was no fire, he estimated the passage of air at 33 cubic feet per minute; giving an average of about 52 cubic feet per minute for the 55 hours, or about 170,000 cubic feet for the whole period. On the third day the speed became greatly reduced, owing to the foulness of the screen, which was accordingly removed. The weather was bright and dry, with much wind, and no more appearance of smoke than is usual in a London square in bright spring weather. On examining the screen, which was by this time practically opaque, I found that the clogging material consisted almost wholly of tarry matter, with very little soot; the coarse particles of soot having been removed by the outer screen already referred to. The tarry matter referred to is, of course, to be attributed to the coal-smoke present in the atmosphere; the contaminating effects of which are practically eliminated from the air, which Mr. Lloyd admits into his rooms, as effectively as though it had been drawn through a respirator. In fact his apparatus is a species of respirator on a large scale.

Seeing the very great comfort that is derived from the use of ventilation of this sort, particularly in foggy weather, when a constant stream of fresh air can be readily maintained without the impurities of the outer atmosphere, it occurs to me that a short description of the system may be read with interest by subscribers to the SANITARY RECORD. It is a little difficult, without the aid of diagrams, to explain details, but the principle of the matter may be briefly made clear. The filtering apparatus already described is fixed outside the house, in such a position that the 'trays' or screens can be readily removed for cleaning from the window or balcony, at the extremity of a tube which passes under the floor of the room and terminates in an open space beneath the hearth of the grate. This open space beneath the hearth is continued upwards on both sides of, behind, and above the stove, terminating in a narrow slit at the back of the chimney-piece, as though, in fact, the whole slab of the chimney-piece were moved an inch or so forward. The chimney, of course, has no communication with the hollow space around and above the grate, but the whole of the air in the hollow space is warmed by the fire, and immediately it is warmed it naturally rises through the opening at the back of the chimney-piece, cold air rushing in through the filter and pipe to supply its place; which cold air is continuously flowing in, being warmed, and rising,—diffusing itself rapidly about the room without causing the least sensation of draught. In winter, therefore, a constant supply of fresh, and at the same time, warm air is obtained, both windows and doors being closed. The natural ventilation of the chimney ensures a steady removal of the already foul air of the room, there being a ready ingress of fresh air to take its place. An invalid is thus enabled to enjoy thorough ventilation in cold and 'heavy' weather, by obtaining, without draught, a constant and steady supply of air, not only purified, but warmed, before its entrance into the room.

Mr. Lloyd combines with this ventilating apparatus an ingenious arrangement for regulating the draught of his chimney, and so indirectly regulating the influx of fresh air; but a description of the stoves, which are simple enough, would scarcely be intelligible without a diagram. As Mr. Lloyd has been good enough to allow me to describe his apparatus in these columns, I have little doubt that his good nature will extend itself to the supply of more detailed information to anyone who may contemplate the adoption of his plan, with regard to one of the chief and most generally overlooked branches of house-sanitation.

PROOFS AND ESTIMATES OF SANITARY PROGRESS.

BY EDWIN CHADWICK, C.B.

I SHOULD be glad if, for the information of those engaged in sanitary works, you could find room for this revised copy of a statement of mine showing some of the economical results obtained by them:—

The extent of the excellent papers, and of the discourses on purely medical or curative science, at the International Medical Congress, precluded more than very slight attention being given to sanitative or preventive science, and prevented a notice of the means of the reduction of a percentage of sickness or death-rate by it, or by curative science. Since the congress was held the report of the Local Government Board has appeared, and contains a statement of the progress of sanitary work in England and Wales, to which public attention may now be well directed both in justice to the subject and to the services of the new Local Health Officers appointed, and acting, as yet, with very imperfect attributions and functions. The statement of the report is as follows:—

'Before concluding the part of our report which relates to sanitary administration, it may be useful to draw attention to the annual death-rate for some years past, as indicating the effect which recent sanitary measures would appear to have had upon the public health.

'The following table shows the death-rate for each of the four last decennial periods:—

England and Wales.

Annual Death-rate per 1000.	1841-50.	1851-60.	1861-70.	1871-80.
All causes	22.4 ...	22.2 ...	22.5 ...	21.5
Seven zymotic diseases	— ...	4.11 ...	4.14 ...	3.36
Fever	— ...	0.91 ...	0.88 ...	0.49

'From the above figures it will be seen that, speaking generally, the death-rate of the country remained stationary from 1840 to 1870, but that in the period 1871-80 it fell from 22.5 (of the previous decade) to 21.5, a reduction equivalent to nearly 4½ per cent. It may, therefore, be roughly estimated that about a quarter of a million of persons were saved from death in the ten years 1871-80, who would have died if the death-rate had been the same as in the previous thirty years. If twelve cases of serious but non-fatal illness be reckoned for every death, it follows that about 3,000,000 persons, or over one-ninth of the whole population, have been saved from a sick bed by some influences at work in the past decade, which had not been in operation previously. The case, indeed, is still stronger than this. The death-rate of rural districts is habitually lower than that of urban districts; and as the population is steadily concentrating itself, more and more, into the towns, the

death-rate of the whole country would tend to increase, if the other circumstances affecting it remained the same. When we find that this tendency has been so much more than merely counteracted, it becomes interesting to see where the gain has been; and to endeavour to trace some of the causes to which it may be due.

'Comparing, then, 1861-70 with 1871-80, it will be seen from the foregoing figures, that of the entire reduction of 1.0 in the death-rate, more than three-quarters (4.14—3.36=0.78) comes under the head of "The Seven Zymotic Diseases"; of the diseases, that is, which are most influenced by sanitary improvements, and most amenable to control by the action of Sanitary Authorities. And of this three-quarters, just half (0.88—0.49=0.39), or three-eighths of the entire reduction, is in 'Fever'—the disease which, more than any other, shows itself in connection with such faults of drainage, of water-supply, and of filth accumulation, as it is within the province of good sanitary administration to remove.

'It is particularly significant that, since the year 1870, when the fever death-rate was 0.80 per 1000, it has fallen pretty steadily, year by year, as follows, down to 0.32 in 1880:—

1871	.70	1876	.44
1872	.61	1877	.41
1873	.58	1878	.42
1874	.59	1879	.30
1875	.55	1880	.32

'Thus in the five years, 1871-5, the fever death-rate was 0.61; in the five years 1876-80 it was 0.38.'

During the decade from 1861 to 1870, there appeared to be no gain from the outlay on sanitary works or on sanitary service in England and Wales; but since then the service appears to have made an effective start, and the pecuniary gain may be thus stated:—Under the inquiry as to interments, the cost of funerals,—all round,—was ascertained to be £5 each. The gain under that head will, therefore, be about one million by the quarter of a million of funerals saved during the last decade. The direct cost of sickness has been estimated at about £1 per case. The gain under that head during the decade will, therefore, amount to about three millions; a gain, that is to say, of medical treatment and other expenses. But the gain to the wage classes, from the saving of lost labour, will have been far greater. Dr. James Watts, who has had great experience in friendly societies, states the average loss of working time at two working weeks and a half per member between twenty-one and seventy years of age, and he estimates the total loss to the wage classes, by the loss of work through sickness, at upwards of thirteen millions per annum. The gain derivable from sanitation may be further illustrated from its advance in military service. The first British army went out to the Crimea under the established curative or medical service, and it was lost. Sanitary Commissioners, trained in service under the first General Board of Health, were then sent out to reform the condition of hospitals and camp, and within three months reduced the sickness and mortality from a plague-rate down to an ordinary standard of health, and by the end of the summer of 1855, to a rate lower than that of the best hospitals at home; and the War Minister declared in Parliament that by the application of their science the second army had been saved. Since then, the Army Medical Department has applied extended sanitary operations. Their exercise under great difficulties is best shown in India. Formerly the death-rate in the Indian army was 69 per 1000 per annum. The average mortality from 1869 to 1878 was only 20.41. There was, therefore, a gain of 48.59 per 1000; or, on the present force out there, a gain of 2,350 men. The death-rate of the army at home was formerly 18 per 1000. In the year 1879 it was 7.55, being a gain of 10.55 per 1000. As the strength of the army in 1879 was 80,700, the gain was 843 per annum. The total gain to the army in India, and the army at home, and the rest of the army, will be 3,443 men per annum. As each soldier is estimated at £100, this represents in money value £344,000, or more than a third of a million. It is not very easy to get at the real amount of the sickness, but the total gain, including the diminished death-rate, is considered to be under-rated at half a million per annum. For the decade, the total saving of military force from death have been upwards of forty thousand men, and upwards of eight millions and a quarter in money.

The total number of men killed on the battle-field and on the deck, including those killed at Waterloo, Trafalgar, and the most severe battles during the twenty-two years' war was, according to the Army returns, 19,796. The lives saved from premature destruction by the civil sanitary service, during each of the ten years of the decade, was 25,000. The wounded during the twenty-two years' war were 79,709; but, taking a serious sickness as equivalent to a wound, the achievement of the sanitary service has been, during the same period, some three millions of cases saved by the civil sanitary service. The deaths by steam explosions, in mines and on railways, amount to about 5,000 annually, but the lives saved by the civil sanitary service in England and Wales are five-fold greater than the lives thus destroyed by civil accidental violence. A reduction of the death-rate by 4¼ per cent. is only an instalment of sanitary progress. Thus, in the instance of Croydon, visited by the delegates of the Congress, the death-rate has been reduced from 25 to 16 per 1000, chiefly by the methods introduced by the first General Board of Health, by which spring supplies of pure water are carried into the houses, and the fouled water carried at once out of the houses and out of the town, by one Local Board Authority; while all putrescible matter, instead of remaining for months and years in conditions of putrefaction, is undecomposed, and flows upon the land within two hours. So in Salisbury, Leamington, and a number of other places. At Croydon, it has been stated by Dr. Alfred Carpenter that, by complete sanitation, the death-rate might be reduced to 10 in a thousand. In the Metropolis the death-rates among the wage classes in their common dwellings is upwards of 30 per 1000. In the model dwellings in London, it is, however, about 16 or 17, even with surrounding deteriorating conditions. On the demonstrations of various model instances, it may be held that the reduction of the general death-rate by 4¼ per cent., as reported, satisfactory as this is, cannot be considered more than one-third of the results obtainable by advanced sanitary administration and further sanitary works. The pain and misery, and the social disorder, occasioned by excessive sickness and premature mortality, are generally beyond pecuniary estimation. Such estimates as those given serve to show the money loss incurred by inattention to the continuance of preventible physical evils.

SCIENCE AND ART OF SANITARY PLUMBING.

ABSTRACT OF LECTURES DELIVERED FOR THE NATIONAL HEALTH SOCIETY,

BY S. STEVENS HELLYER, ESQ.,
At the Society of Arts.

SOIL-PIPE AND WASTE-PIPE CONNECTIONS, DRAIN VENTILATION, AND FLUSHING.

(Concluded.)

er carriage was to be system of removal, water ɔe used freely. If the slops and sullage of a were to be effectually removed, whatever else be limited in a house, water must not be. To water the cleansing power of waste-pipes, soil- and drains, and then to limit its use, would be e the filth lodging, decomposing, and corroding pipes. How we should ridicule a Vestry Board sent a street scavenger to clean Regent Street, ith one sweep of his broom, to begin at one ıd push it right through the centre of the street other end. And yet such a sweep track as presented the treatment a soil-pipe often got. pe was befouled all over by an offensive excre- discharge sent into it, but the water used for ıg out the pipe was only sufficient, in many to cleanse a channel down its sides. A pailful s, collected from chamber utensils, was thrown a water-closet in a body sufficiently large to e whole of the soil-pipe belonging to the closet, t the same time, a water-waste preventing valve ɔened for two gallons of water to pass into the to cleanse it; but the water, squirting into the closet as if it came from a boy's syringe, was e value for cleansing the pipe, as it did not the whole of the parts fouled, and the parts hed became coated over with excremental , corroding up the pipe and making it un- ɔome.

real cause of pipes stopping up was the want d water flushing. It would be possible to stop -in. pipe to a water-closet or urinal with a bad of water to it, quicker than a 3½-in. one with d supply of water. No waste-pipe, soil-pipe, in could be kept wholesome unless adequate s of water were sent through it immediately lischarging dirty water or excremental matter ; and before such discharges were sent through ıps they ought to be largely diluted with water ɔcially in such cases as the contents from ɔer-utensils. Measure water into slop-sinks ater-closets by the table-spoonful, and whatever ıight be clean and wholesome about the house, ittings with their belongings would not be.

knew that it was possible to utilise two gallons ter—the quantity allowed for water-closets by ɔndon water companies in accordance with the polis Water Act of 1871—in such a way that it pass into a closet with greater cleansing power wice that quantity badly supplied, but that was ıe point now in question. He contended that allons of water were insufficient for keeping a closet and its belongings wholesome, and he peaking to a body of practical men whose n on the matter he should be glad to hear. there ten men in the room who considered a ıllon water-flush sufficient to cleanse a water- basin, trap, soil-pipe, and drain, after usage? ('*No.*') They must knock at the door of Parliament, and send in a message stating that a large body of practical plumbers found from experience that two gallons of water were insufficient to keep a 'house of commons' wholesome, and that, if more water could not be allowed, such places must be abolished. Even when plenty of water could be had, however, the flush was often interfered with by bad appliances. The supply-valves, instead of being equal to flushing out a 4-in. or a 4½-in. soil-pipe, were often only of sufficient size to cleanse a 1¼-in. or 1½-in. pipe; or perhaps the boiler-screw or cistern connection was of smaller diameter than the service-pipe, and the water was, so to speak, 'wire-drawn' through it.

Having called attention to Mr. Rogers Field's flushing-tank as a valuable means of flushing out the drains of a house automatically, the lecturer went on to say that the question of flushing was a very important one, for though ventilating-pipes from drains and soil-pipes might be carried up above the roof, the stink coming from them, where the drainage-pipes were not thoroughly flushed, would be so great that the whole of the atmosphere surrounding our dwellings would at times become largely charged with bad air emitted from such pipes, and though such bad air would no doubt get largely diluted before it was breathed, in great cities—at any rate, in a huge city like London—it would pass at times pretty freely into houses. When the drainage of London houses was properly ventilated—*i.e.*, when every waste-pipe, soil-pipe, and drain had its ventilating-pipe, the number of such pipes would be enormous—hundreds of thousands. How important, therefore, was it that the stink coming out of such pipes should be minimised by efficient flushing.

Having dwelt on some other points, including the supply of water to urinals, the arrest of grease before it passed into the drains, precautions to be taken against pipe-freezing, the storage of water (recommending, by preference, slate cisterns for water intended for dietetic and potable purposes), and the construction and finishing of water-closet rooms, the lecturer made the following observations as to a suggested code of rules for house sanitation. Various opinions were now before the public as to the best method of draining a house. Several had been referred to during the lectures, and he would simply say, in concluding his remarks on 'the science and art of sanitary plumbing', that it was about time that the opinions of sanitarians on such matters should be consolidated. The principles of house-drainage were so far determined upon that there ought to be no great difficulty in framing a good sanitary code as a general basis to work from. He would have the boundary lines of such a code marked out with silken cords rather than iron bands; for, like all new things, sanitary knowledge should have room to grow. He believed it would be just as easy for a tailor to make a suit of clothes to suit all climates as it would be to lay down a code of sanitary rules to suit all cases. If he had to draw up such a code of rules, he should make them read somewhat as follows, viz.:—

1. That pure water shall be supplied to every house for dietetic purposes, and where this water cannot be drawn direct from a constant supply, it shall be stored in cisterns easily accessible for cleansing purposes; and such cisterns shall be so placed that no vitiated air can reach them, either from the house, water-closets, or ventilating-pipes—from waste-pipes, soil-pipes, or drains.

2. That no draw-off cock to any sink or 'fitting',

other than a water-closet, shall be supplied from a cistern fitted in a water-closet, or standing in a place where any contaminated air can reach it, or from a cistern or service-pipe which also supplies a water-closet.

3. That every drain shall be trapped off from the sewer by a self-cleansing intercepting sewer-trap, fixed in every case outside the house; and where the mouths or inlets of such traps cannot be left open to the atmosphere, air-induct pipes should be taken into the drain immediately on the house side of such traps.

4. No drain shall enter the walls of a detached or semi-detached house.

5. In a line of houses, as in terraces and streets, where it is impossible for the drain to reach the soil-pipes without coming inside the house, such drain shall be of cast iron, heavy water-main strength, and this pipe shall be 'Barffed' or coated with solution, and laid in a brick trench, or fixed on the face of the basement walls, and its joints well caulked with lead. The drains shall be so ventilated that not a foot of it shall be without a free circulation of air through it.

6. Every drain from a house shall be so ventilated that no stagnant air shall remain in any part of it; and where this cannot be done by air-shafts, ventilating pipes shall be fixed, and the drain divided into sections, and its branch drains, when of great lengths, localised so as to ensure ventilation in the entire system of drainage.

7. All soil-pipes, where practicable, shall be fixed outside the house, with their discharging ends exposed to the atmosphere—either directly by emptying into open traps, or indirectly by foot ventilation; and such pipes shall be carried up to the highest points of the roof full-size, for proper ventilation, having their terminals well removed from all openings into the roof or house.

8. All dirty-water wastes from sinks, baths, lavatories, etc., shall discharge themselves with open ends into intercepting traps fixed outside the house, and such pipes shall be continued up through the roof full-size for ventilation.

9. All clean-water wastes from cisterns, cistern-safes, etc., shall be kept separate from other wastes, and shall discharge with open ends into the atmosphere, well away from all drain-traps or places where any bad air can reach them.

10. All wastes or overflow-pipes from safes under water-closets, baths, etc., shall be kept separate from other waste-pipes, and shall be made to discharge in the open air.

11. Every sanitary 'fitting' fixed inside a house where foul matter, or contaminated water, is passed into it, or from it, shall have its waste-pipe trapped off from the house, and such trapping shall be made immediately under such 'fitting'.

12. All traps fixed inside the house shall be self-cleansing; and no trap which fouls itself, or is not easily flushed out, shall be used on the drainage outside the house.

13. All traps to water-closets, slop-sinks, sinks, baths, lavatories, etc., which can have their water syphoned out by the use of any fitting upon a pipe in connection with them, or by the use of themselves, shall be ventilated, to prevent such syphonage, and also to allow of the branch pipes being ventilated.

14. No sanitary fitting shall be fixed which will not allow a good flush of water to be sent through it to cleanse it and its belongings, to prevent any pipe from it—be it a waste-pipe, soil-pipe, or drain getting unwholesome.

15. Every house shall be provided with and efficient means for flushing out the whol drainage.

16. The walls inside water-closet seats, th and the walls of water-closets, should be ma tight, to prevent any odours in them pas any room adjoining, through a crevice, cr opening.

17. The rooms of water-closets should ventilated, so that a constant change of air m place in them.

In conclusion, Mr. Hellyer observed that w charge might be laid against journeymen pl want of interest in their trade could not be against them, for he questioned if the mem any other branch of the great building trade have come out night after night, during the h of summer, to listen to dry lectures. Lying i strong arms, slumbering in their hardened n resting in their well-trained fingers and e hands, was, in a large measure, the health leviathan city. The plumber's part in ma house, a town, a city, healthy, was enormou believed that if plumbing work was done principles laid down in his lectures, this hu teeming though it was with human beings, wo come the healthiest, as it was now the greate in the world. Let the plumbers of to-day see their work in the very best way possible, so th successors in a future age might say—'How w plumbers of the latter part of the nineteenth c did their work!'

The chairman addressed a few observations meeting, and a vote of thanks to Mr. Hellyer lectures concluded the proceedings.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-CO FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

VIII.

LAMBETH PATENT WATER DELIVERY VALVES HIGH AND LOW PRESSURES, ETC., ETC.

ONE of the most important specialities manufac and sold by Messrs. Doulton is to be found i most excellent collection of various kinds of for the supply of water to sinks, lavatories, u and other places; and I now give below, in de short description of some of them, which will the reader to judge of their character. For a prehensive understanding of the various ki valves, however, it would almost be requisite the show-rooms, and to note there the articles selves, set up and in action.

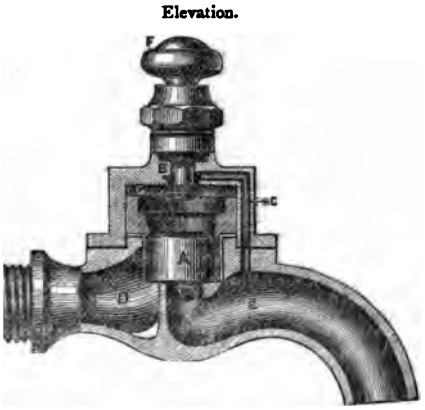
The great want of the day, or what was th want of the day before these appliances of Doulton and Co. were launched into the mark a valve capable of withstanding high press supply; and now that it is certain that Lond not much longer be served by the intermittent from cisterns, etc., for which low pressure would suffice, but will, on the contrary, be ulti supplied from a constant service direct fro water-works, when high pressure valves will

iable, it will be easily understood that a form e commensurate with the work to be per- is a positive necessity and would prove a oon to the community. Innumerable patents een taken out from time to time, but all of ere found to be more or less defective. The le generally permitted to be used by the various Companies was the screw-down action, and ey allowed because the defects of this system ess in number than those of other systems of

It is well known, however, that screw-down quire constant renewal of their parts, the faces ılly, which are quickly cut through by the ex- pressure exerted in screwing down. More- crew-down valves are not in their nature self- articles, and may, in fact, be left partly opened, asting water without necessarily causing suffi- ttention to this defect. It is proved already in a that there is an enormous waste of water defective fittings, wherever the constant supply en introduced, with its attendant increase of e.

patent valve appliances introduced by Messrs. n and Co. absolutely remove all fear of water g, for each valve constructed on this principle ectly self-closing; it closes by the pressure of ter, so that the higher the pressure, the tighter he valve become. It presents, moreover, a am amount of friction, and has very few work- rts. The principle upon which the valve is

Elevation.



Section.
Doulton's Patent Press-down Valve.

cted can be seen by the above wood-cuts, and described as follows:—The valve consists of piston A enclosed in an outer chamber, and ne water from the supply, on the side D, raises ton A, it allows the water to pass out of the E. But, at the same time, a portion of the water is forcing its way through the annular space between the piston and the cover, and as soon as the space C above the piston is filled, the latter is forced down to its seat, the water having no way of escape, and the area of the top of the piston being in excess of the underside surface. To open the valve it is only necessary to depress the knob F, which action opens the relief valve B; this allows the water which has accumulated at C to escape through the passage C into the bib E, and the pressure being relieved from the back of the piston, the full pressure of the main is exerted on the under side, and again drives it up, thus giving free passage through the valve. On the release of the knob F, the water again accumulates and the valve closes. The action of the whole is gradual and completely prevents concussion.

The same system of application is so expansive in its nature that it lends itself to almost every kind of valve, both for high and low pressures. It may be applied to low pressure supplies by the introduction of a spring, and the omission of the relief valve, arranging the piston so as to pull it off the face, and against the pressure. The system of water-supply now under consideration is so arranged, when the object is to supply a closet, for instance, that it will yield the necessary afterflush without the use of a bellows arrangement or other separate regulator. It is regulated here by means of a screw, which allows the water to get behind the piston, (quickly or slowly, as may be required) to shut down the valve.

Doulton's Patent Urinal Valve.

The urinal valve is valuable for the same reason, inasmuch as by a single touch it can be arranged to ensure the discharge of a given quantity of flushing water. It is moreover equally applicable, and with similar great success, to a treadle action supply, the action required to open the valve being so small (about one-sixteenth-of-an-inch), that the motion in opening and shutting is scarcely perceptible. The above principle of Patent Anti-percussion Valve Supply is equally appreciable for lavatories.

These valves can also be made to close immediately upon releasing the knob, cam, or other arrangement, or they can be so constructed as to discharge a given quantity, thus filling the basin; a further advantage

being, that the flow may be stopped at will, by means of a small lever or screw. Messrs. Doulton and Co. manufacture various patterns for high and low pressure uses, but the most notable are those supplied for testing at the Houses of Parliament, where they have proved most successful, notwithstanding the destructive action of the water, which is exceptionally great, and also answering with the combined action of hot water. Two sorts of valves have been used, one of the same principle as that shewn in section, and found to answer admirably wherever it has been tried. A form of this is here shewn, with a vertical cam action.

Doulton's Patent Lavatory Valve.

Doulton's Patent Cam Action Valve.

Another form is made by Messrs. Doulton and Co., which is admirably adapted for hot water, in which a lever, with a wood-covered handle is used, similar in appearance to the ordinary hot-water valve handle. This lever acts by means of a quick thread screw, upon a spindle, which forces the piston downwards from the seat, and on turning the handle back, the piston is free to rise, the pressure, as in the other case, accumulating behind it.

Another speciality of the firm consists in ball-valves, and these are exceptionally good, inasmuch as they remain almost at full bore until the moment of closing off, and for the highest pressure require only a small ball and a very short lever. They are very well adapted for fixing in places where the space is limited, and are suitable for the highest pressures. The level of the water may be altered by simply screwing and unscrewing the ball-stem.

Messrs. Doulton have also made a great improvement in rubber diaphragm valves. In the ordinary screw-down diaphragm the rubber is easily cut through by over-screwing, but in the improved form a cam lever is used, which, when raised, releases the rubber, and when again turned down depresses the rubber to an extent sufficient to keep it tight. Such is as comprehensive a description of these new and valuable goods as we can well afford to give, and we will only say in conclusion that they have been carefully designed to meet the requirements of the various water companies under the regulations approved by the Board of Trade.

THE

SANITARY RECORD.

OCTOBER 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

PRACTICAL INSTRUCTION IN PLUMBING AND SANITARY ENGINEERING.

ALL who are interested in sanitation will be interested to learn that it is the purpose of Mr. Ernest Hart, Chairman of Council of the National Health Society, to bring forward, early in the ensuing season, a plan of action by which the National Health Society, in concert with other bodies, may follow up the useful course of lectures to plumbers, and on competition in plumbing, which, with the aid of the Society of Arts and Mr. Hellyer, it has carried out during the last summer, by a more continuous effort to afford the means of a more thorough education of plumbers and the mechanics engaged in sanitary engineering, to be given in a Trades' School of Plumbing and Sanitary Engineering.

It is well known that the teaching in the workshop, which a young apprentice gets, is usually totally wanting in theoretical data, and very limited, and often very faulty and defective in practical methods. In a trades' school manual work can be conducted in such a manner as to accustom the apprentice or student to the best methods known to the shops, and, at the same time, to furnish such a thorough knowledge of the principles, as may lay the basis for sound and intelligent workmanship, and facilitate further improvements. It will be our object in this plan to establish a school of plumbing with the approval and assistance of the leading houses in London, and of the leading mechanics in the trade. The charge for instruction would be arranged so as to cover the actual cost of teaching and materials, so that while, on the one hand, the schools would not have the eleemosynary character, on the other, they would not aim at making money.

There is every reason to hope that the assistance

bodies, such as the Society of Arts and the Guild Plumbers, who have already expressed their sym-thy and shown their approval and willingness to l the steps hitherto taken by the National Health ciety towards the improvement of plumbing and actical sanitary engineering, will be accorded to e further efforts to be made. An excellent example ll be found in the trades' schools of New York, der the management of Mr. Wingate, of which a ospectus, so far as relates to instruction in plumb-g and sanitary engineering, will be found in another lumn.

DISEASE AND ALIMENTATION.

HE interest of the careful report that Mr. Spear s presented to the Local Government Board, on e outbreak of wool-sorters' disease which occurred st year in Bradford and the neighbouring district the West Riding, has, unfortunately for him, been rgely discounted by the discussions which have, nce his inquiries, taken place at medical societies id in the medical press, as to the nature and iology of the disease. Wool-sorters' disease as now been ascertained to be beyond doubt lentical with that anthrax fever which is known attack men by transmission from the lower nimals, as, indeed, the microscopical examina-ions and pathological experiments of Dr. Green-ield clearly indicate. It might have been thought hat the pronounced symptomatology of anthrax, the light of its known parasitic nature and s observed anatomy, would render possible an terpretation of the pathological conditions which nstitute the disease. The question as to the channel which the poison reaches the system is obviously e of moment. The apparent latency at times of e disease germs; the ill-health, of indefinite fea-res and duration, from which those infected often ffer, and which sometimes ushers in the fully-veloped disease; the sudden onset of the latter der such circumstances, and its then specified urse, are all observations that, if we could rightly terpret their significance, might prove of much im-rtance, not only in their bearing upon the disease mediately in question, but on infective processes general.

Mr. Spear has not, as might be expected, any ry definite information to give with regard to this bject; but he advances a very curious theory, ich may, perhaps, bear fruit in the future. He ys that early in the inquiry the fact attracted at-tion that in an extraordinarily large proportion of cases the initial or prodromal stage of the dis-e terminated, and the acute and often fatal ones mmenced between Saturday evenings and the nday mornings. He could not, on the most care-enquiry, attribute this incidence of the disease to peculiarity of occupation, and the suggestion s forced upon his mind from an attentive study of histories, that between the hour of leaving work the Saturday afternoon and the Sunday some-thing must occur to awaken the slumbering disease germs, or to give an enormous impetus to the disease. There is one marked difference between the mode of living of the majority of workers on the Saturdays and Sundays, and on other days of the week. On the week-days they make more or less hurried meals, and a large number take their meals to their work. On Saturdays, when they dine at home, but more especially on Sundays, a much larger amount of vegetable food is eaten than on other days. Moreover, during what is afterwards assumed to be the initial stage of the disease, a man often imagines that he is suffering from a cold; and it is a very usual practice indeed for him to lay by on Saturday evening and Sunday, and doctor himself with copious draughts of various herb decoctions. In twenty-two recent cases of the disease where special inquiry was made on this point, the practice of drinking such infusions had been carried out during the stage of such initial symptoms in no less than fifteen; and whether there exists a causal relation or not, it was not very long after these imbibitions that the violent symptoms of the disease in these cases manifested themselves. In nearly every instance where satisfactory information was obtainable, the development of these violent symptoms was found to be co-existent with the ingestion of vegetable food in some form or other.

In the progress of some other cases, again, after a remission of the symptoms, a relapse seemed to follow the ingestion of vegetable food; and this was especially observed in three cases, where patients were much better and thought to be recovered, and were downstairs eating fruit, and in one case cabbage also, twenty-four hours before the fatal termination of their illnesses. Mr. Spear is fully alive to the danger of drawing deductions from the mere concurrence of two circumstances, when one of them is so common a one as the eating of vegetable food or fruit. But, in the light of our knowledge of the natural history of the contagium, by which it might appear that a causative relation between one or the other of these circumstances is not as improbable as at first sight it may seem; and in view, also, of the immensely important issues which are involved if this relation really obtains, the subject is clearly worth careful attention and further study.

It is not a little singular that, while these considerations were weighing with Mr. Spear, corroboration came to hand from a wholly unexpected and independent source—from Constantinople—where it seems anthrax is well known, and engages the special attention of a certain class of practitioners, one of whom enjoys a great reputation, and only pretends to cure this one disease. The treatment he adopts has nothing special in it; but the diet is limited to caviare and bread, and a little spirit, vegetables and fruit being specially forbidden. Thus it would seem that these Turkish doctors have arrived at a conclusion pointing distinctly in the same direction as Mr. Spear's inquiries, which, indeed, derive countenance

from the observations of Professor Feser of Munich. If there really be anything more than coincidence in the facts that Mr. Spear has brought together, the question of the influence of alimentation upon disease will acquire a much more important significance than at present. It is greatly to be hoped that the Local Government Board (who have funds at their disposal for the prosecution of scientific inquiries of this nature) will not allow the question to remain in its present initial stage, but will at once institute experiments with the view of disproving or corroborating Mr. Spear's observations.

NOTES OF THE MONTH.

SMALL-POX AT A MASKED BALL.

The record of an outbreak of small-pox among a factory population in West Troy very completely illustrates how recklessly the contagion is apt to be spread among the common people, and how promptly great employers of such people may take action which shall stamp out such an epidemic. Eighty persons were present at a masquerade party, and after several hours, when the company sat down to supper unmasked, it was discovered that one young woman had varioloid eruption on her face; but, instead of at once dispersing, the company continued their revelry until morning. The result of this wanton and culpable exposure was that twenty-two of the eighty individuals were attacked with varioloid or variola. As these cases all occurred in families of *employées* of a certain firm of manufacturers of woollen goods, the firm at once closed their mills, and ordered all persons employed by them, in whatever capacity, to be vaccinated; enforcing the order by insisting that no individual should continue in their employment without presenting a certificate from a physician showing that they had been vaccinated, even though they might have had small-pox itself. The same emphatic orders also extended to the most thorough purification and disinfection of all dwellings in the place, and the consequence was that the outbreak was suddenly and completely terminated. Twenty-two cases resulted from exposure in the dance-hall, and eleven persons contracted the disease from exposure to these cases, while only one case occurred outside of the families thus exposed. Five of the whole number of cases were very severe, but none of them proved fatal.

SOMETHING NEW IN CHILD-POISONING.

With the progress of science the conveniences for 'the murder of the innocents' are rapidly multiplying, and it is a lucky child that escapes them all. If the infant does not suck death from its nursing bottle, it is likely to have fresh opportunities for involuntary suicide in its first playthings, made of poisoned rubber or coloured with dangerous pigments; and if these do not answer the purpose, new means of making away with itself will be furnished at every step in its future career. As a little addition to these facilities for shuffling off the mortal coil at an early age, it has been recently found that the coloured crayon pencils now so much used by children are coloured by poisonous dies, and those who use them should be taught not to put them in the mouth. The following case is given by Dr. Cameron in the Dublin *Journal of Medical Science* for July 1881:—A child was taken with severe vomiting, and appeared to be suffering acutely. On closely examining the vomited matter, very small particles of a green substance, brighter than biliary matter, were observed in it. On touching them with solution of ammonia they acquired a deep blue colour, showing the presence of copper, and therefore, probably, of arsenic. Precipitated ferric hydroxylate $Fe_2(HO)_6$, was promptly prepared and administered to the child, as were also ipecacuanha, a little mustard, and abundance of warm water. The washing out of the child's stomach was continued until the disappearance of the green particles from the vomit, which, however, did not take place for more than two hours. In order to dislodge the poison from the bowels a purgative was administered. The egesta were found to contain numerous bright green fragments, and they did not disappear until the end of the second day. The child was feverish, restless, and sleepless for about forty hours, after which he became slowly better, but was not convalescent until about the seventh day. His abdomen was tympanitic, his features were shrunken, and the cerebral symptoms were severe. On three occasions the patient nearly died from collapse. He recovered after about a month. It was found, on examination, that he had eaten a portion of a green-coloured crayon, which, on testing, was found to be coloured with *arsenite of copper*, the amount of arsenious acid being 1.72 per cent.

LONGEVITY AMONG THE JEWS.

Dr. S. Gibbon, Medical Officer of Health for the Holborn District, London, in his report for the last year, says that whatever may be the cause, there is no doubt that the Jew's life in London is, on the average, worth twice as many years as a Christian's. The Hebrews of the metropolis are notoriously exempt from tubercular and scrofula taint. It is very rare that one meets with pulmonary consumption among them. The Medical Officer of one of their large schools has remarked that their children do not die in anything like the same ratio as Gentile children; and in the District of Whitechapel the Medical Officer of Health has reported that on the north side of High Street, occupied by the Jews, the average death-rate is twenty per thousand, while on the south side, occupied by English and Irish Gentiles, it is forty-three per thousand.

A SEA-SIDE NURSERY.

The sea-side nursery of St. John's Guild, New York, recently opened at Cedar Grove, near New Dorp, Staten Island, is designed to be a model institution of its kind. It is a wooden structure, of yellow pine, having a frontage on the water (from which it is distant about thirty feet) of six hundred feet, and when entirely completed will consist of a central building and two wings. One of the wings is finished, but the other will not be erected till next summer. Special attention has been paid to the ventilation and drainage, and the closets are in a small, separate wing connected with the main building. All around the house there are verandahs, some of which will at all times be in the shade. The Guild owns ten acres in the rear of the nursery, and the most of the land is covered by a fine cedar grove, which, it is believed, will add no little to the salubrity of the location. This institution is designed, not to take the place of the floating hospital, but to supplement the work hitherto carried on by its agency. It

frequently happens that children when seriously ill after spending a day on the water on one of the excursions (although greatly benefited for the time being) are reduced to their previous condition after a single night spent in the unwholesome atmosphere of the tenement-house. Hence, to secure permanent benefit in these worst cases taken upon the excursions, a certain number of the children will be received into the nursery for as long a period as the circumstances in each case may require. The cost of endowing a bed in the institution is one hundred dollars, and the maintenance of quite a number has already thus been permanently secured.

A CHEAP DISINFECTANT.

A cheap and useful disinfectant is a solution of chloride of lead. It is inodorous, effective, and its cost very small. It may be prepared as follows:—Take half a drachm of nitrate of lead and dissolve in a pint or more of boiling water. Dissolve two drachms of common salt in a pail or bucket of water, pour the two solutions together, and allow the sediment to subside. The clear supernatant fluid will be a saturated solution of chloride of lead. A cloth dipped in a solution of chloride of lead and hung up in a room will sweeten a fetid atmosphere instantaneously, or the solution thrown down a sink, water-closet, or drain, or over a heap of refuse, will produce a like result.

REGISTRATION OF PLUMBERS.

The plumbers of New York are protesting against the enforcement of the registration act, because it compels them, they say, to submit plans to non-experts. The methods adopted by the Board of Health to carry out the law are as follows:—Three forms have been drawn up. Two provide for the registration of master and journeyman plumbers, and end with an agreement to comply with the rules established by the Board. The third blank is a notice of violation, signed by the secretary of the Board, with extracts from the new law. This will be sent to all plumbers doing faulty work in new buildings, when such fact is reported to the Board. It gives the plumber so many days to conform to the plan approved by the Board, and warns him of the penalty of non-compliance therewith.

GERMAN SANITARY EXHIBITION, 1882.

At Berlin, active preparations are being made for the German Sanitary Exhibition to be held in that city next year, and officially styled, "*Die Allgemeine Deutsche Ausstellung auf dem Gebiete der Hygiene und des Rettungswesens*"; for it will include appliances for the direct preservation of life, or even property, as well as inventions which counteract sources of disease. The authorities are issuing, from time to time, a circular, which has already reached its fourth number. The Prussian Minister of Public Works has granted that exhibited goods not sold at the close of the exhibition may be returned carriage-free; and the Minister of Finance will permit the import and export of all exhibited goods duty-free. The Central Committee have decided to beg Her Imperial Majesty, the Empress of Germany, to bestow her patronage on the exhibition, which will be held on the site of the Industrial Exhibition of 1879. The governments of several German States have been very liberal in granting funds for defraying expenses connected with the dispatch of their contributions to Berlin, and local committees are in active process of formation. Cologne, Breslau, Landshut, Schwerin, and Hamburgh, have, in particular, shown great activity. The Committee from the great Rhenish cathedral-city have already appointed commissioners for nearly every section of the exhibition, which, considering that there are thirty-five special departments, is a proof of the energy of the medical and sanitary authorities of Cologne. The Central Committee indicate how special prominence will be given to municipal and parochial sanitary questions, encouraging local and private enterprise, in contradistinction to more centralising influences. A fair idea of the very wide scope of the undertaking may be gained by a perusal of the list of special departments as given in the official circular. Thus there are two separate sections for 'Dwelling-houses' and 'Institutions where large numbers of persons are congregated'. Among other groups are 'Sites, and the nature of their position, soil, and air'; 'Thoroughfares and Public Squares, etc.'; 'Public Water-supply'; 'Lighting of Streets and Houses'; 'Cattle-sheds and Slaughter-houses'; 'Public Baths'; 'Public Laundries'; 'Public Educational Establishments'; 'Hotels and Eating-houses'; 'Manufactories and Laboratories'; 'Agricultural Sanitary Arrangements'; 'Means of Supply of Provisions and Catering for Public Enjoyment (*Nahrungs-und Genussmittel*)'. 'Communication by Water-Highways'; 'Clothing'; 'Infectious Diseases'; Hospitals, Asylums, and Convalescent Establishments'; 'Mortuaries and Interments'; 'Veterinary Knowledge'; 'Science, Literature, and Statistics'; 'Fire-Escapes and Fire-Engines'; 'Protection against Lightning, Inundation, Explosives, Accidents in Works conducted under Water, Accidents in Mining Operations, and Accidents from Machinery and Boilers': all these six sources of danger are the subjects of distinct sections. Lastly, there is a section for the immediate treatment of the victims of accident. A more comprehensive scheme could not be imagined; and, in order to meet all requirements, the Central Committee are actively pushing forward the construction of the exhibition buildings, to be commenced shortly, and are planning the arrangement of the exhibition grounds, on which they propose to erect not only the customary refreshment-rooms and concert-gardens, but also a large pond for the display of newly designed boats, diving-apparatus, and appliances for rescue from drowning.

THE LIVERPOOL BUILDING AND SANITARY ACTS.

Amongst the Private Bill applications to be made in the next session of Parliament is one by the Liverpool Corporation for powers to amend the local building and sanitary Acts, and it is intended to hold a conference with the Architectural Society on the several amendments which it is proposed to make in the existing Acts. Amongst others, the contemplated amendments include powers to have cases of infectious disease compulsorily registered; also that powers shall be given to the Council to buy insanitary property by agreement, if they can, instead of compulsorily. They also propose to have control over the great network of telegraph wires over the town. During the discussion which took place when the proposed Bill was before the Council, Sir James A. Picton strongly supported its advisability, observing that its provisions were urgently needed in the interests of the city's welfare.

GROWTH AND WEIGHT OF CHILDREN.

Some interesting studies with reference to the health and growth of children have been made by Dr. Boulton, of the Samaritan Hospital, London. Instead of taking the average of a large number of children measured once, he adopted the plan of measuring a number of children of normal growth, brought up under average circumstances, many times, thus ascertaining their rate of increase. By this means, the annual rate of growth was found to vary between two and three inches for each child per year. Dr. Boulton believes that when a child varies more than a quarter of an inch annually, or when the increase of weight does not correspond with the weight within a margin of safety—put at seven pounds—then it is safe to conclude the child's diet is not good, or possibly some disease is lurking in his system. The curious fact appears that loss of weight always precedes the development of consumption.

INFANTILE MORTALITY AT WEST HARTLEPOOL.

In the *South Durham and Cleveland Mercury* an article has appeared taking exception to the Medical Officer of Health's report on this subject. Dr. Gunley states that there were 23 deaths under five years of age out of 41 deaths at all ages, during the month of August, and that these deaths arose, to a considerable extent, from feeding infants and young children with improper food known as 'boiley', and to the adulteration of milk with well water. He also alludes to the connection between deaths at an early age and the practice of insuring the lives of young children. The editor remarks that if there be a connection between the deaths and adulteration of milk with well water, the water should be analysed and a stop put to the practice. It appears also that the water supply to the town is of hard water, so that no advantage, except that of having the water always ready for use, is attained by taking the Company's water. Under these circumstances it seems that the proper course for the Company to adopt would be to soften the water by Clark's process, and supply it at as reasonable a rate as possible; and for the Improvement Commissioners to close the private wells. Of course this action cannot be taken unless the water of the wells is shown to be injurious, and the Commissioners should therefore at once have a proper analysis made of the suspected water.

WHOLESOME HOUSES.

The following remarks from the Annual Report of the Health Officer of Newcastle make it abundantly clear that some more stringent powers for ensuring the wholesomeness of better-class houses is imperatively required. Mr. Armstrong says that in consequence of the complaint of the occupant of a good-class house of modern construction, who had been obliged to leave it temporarily, on account of very offensive smells of sewer gas, from basement to bedrooms on the third story, a careful examination was made of its sanitary condition. The water-closet was found to be situated on the ground-floor in the interior at the back of the house. The soil-pipe, which was unventilated, passed down inside the main wall of the house to the drain, which traversed the basement from back to front. The drain was obstructed and leaking, and appeared to have been so before, as the wall near it was marked by damp. The main back wall, through which a branch to this drain passed, was hollow, and its interior communicated with all the bedrooms by grated openings intended to serve as outlets for foul air from these rooms, but which acted instead as direct inlets for sewer gas. The bath and lavatory wastes joined the drain directly without disconnection. The drain passed to the sewer in the front street (although there was a sewer at the back) and near the front wall received the waste from the kitchen sink, which was not disconnected. Under these circumstances it is hardly surprising to learn that there had been a death from typhoid fever in this house, and the only wonder must be that the whole of the household was not invaded by some serious attack of illness.

THE PUBLIC HEALTH
DURING SEPTEMBER 1881.

THE mean temperature during September at the Royal Observatory, Greenwich, was 55°.4, and 1°.1 below the average September temperature in 100 years. Last month was colder than any September since that of 1877, when the mean temperature was only 52°.9. The mean was below the average on each of the first 16 days of last month; a slight excess prevailed on seven of the following nine days, after which the mean was below the average until the end of the month. The warmest day of the month was Sunday 18th, when the mean was 62°.1, and 5°.2 above the average; the last day of the month was the coldest, the mean being only 50°.4, showing a deficiency of 4°.5. Rain was measured at Greenwich on 15 of the 30 days in last month to the aggregate amount of 2.2 inches, which was the fifth of an inch below the average September rainfall in 61 years. The rainfall of the first nine months of this year amounted to 17.7 inches at the Greenwich Observatory, and was half an inch below the average amount for that period. The sun was above the horizon 376.9 hours in September, but only 73.8 hours of bright sunshine were recorded at Greenwich; this was 43.4 hours less than the average amount of bright sunshine in the corresponding months of the four years 1877-80. Westerly winds prevailed generally throughout the month until the last three days, when north-easterly winds prevailed.

In twenty of the largest English towns dealt with in the Registrar-General's weekly return, 20,243 births and 10,417 deaths were registered during the four weeks ending 1st inst. The births were equal to an annual rate of 34.7 per 1,000 of the aggregate population of the twenty towns. This rate showed an increase upon that which prevailed in previous months, and almost correspondent with the rate in September 1880. The birth-rate last month did not exceed 32.4 and 32.6 in Plymouth and Hull, while it ranged upwards to 38.9 in Salford, and 39.7 in Brighton. In London the rate was equal to 33.6, whereas it averaged 35.9 in the nineteen provincial towns.

The annual death-rate in the twenty towns during the four weeks of September averaged 17.9 per 1,000 of their estimated population, against 20.9, 19.0, and 24.0 in the three corresponding periods of 1878-9-80. The unseasonably low temperature that prevailed during the greater part of September was favourable to the public health, the death-rate showing a considerable further decline from that which prevailed during the two preceding months. The lowest rate of mortality in the twenty towns last month was 15.1 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follow: Leeds, 15.4; Birmingham, 15.9; Bradford, 16.0; Bristol, 16.3; Plymouth, 16.3; London, 16.6; Oldham, 16.7; Sheffield, 16.8; Portsmouth, 17.8; Norwich, 17.8; Sunderland, 17.9; Salford, 18.2; Newcastle-upon-Tyne, 19.0; Wolverhampton, 19.9; Nottingham, 20.3; Manchester, 21.9; Leicester, 22.5; Liverpool, 24.6; and the highest rate, 26.6, in Hull. The death-rate last month, which did not exceed 16.6 in the metropolis, averaged 19.1 in the nineteen provincial towns, having an aggregate population very little

less than that of London. The high death-rates in Liverpool and Hull were mainly due to excessive zymotic fatality.

The 1017 deaths from all causes in the twenty towns during the four weeks of September included 490 from scarlet fever, 468 from diarrhœa, 254 from 'fever', 228 from whooping cough, 166 from measles, 98 from small-pox, and 71 from diphtheria. Thus 1775, or rather more than 17 per cent. of the deaths from all causes, were referred to the principal zymotic diseases; these were equal to an annual rate of 3.0 per 1,000 in the twenty towns, showing a further decline of 2.0 from the high rates from the same diseases that prevailed in July and August. This decline of zymotic fatality occurred principally among the deaths from diarrhœa, measles, and whooping cough. The zymotic death-rate last month was equal to 2.8 in London, and averaged 3.3 in the nineteen provincial towns, among which it ranged from 0.7 and 1.0 in Brighton and Plymouth, to 4.9 in Leicester, 5.1 in Liverpool, 5.3 in Nottingham, and 10.8 in Hull. This exceptionally high zymotic death-rate in Hull was due to the increased fatality of scarlet fever, which continues severely epidemic in that town.

Scarlet fever was the most fatal zymotic disease in the twenty towns during September, and the annual death-rate from this disease, which had been equal to 0.42, 0.66, and 0.78 in June, July, and August, further rose to 0.84 in September, an increase, however, which is not larger than that which generally takes place at this time of the year. The mean death-rate from this disease was somewhat greater in the nineteen provincial towns than in London; the highest rates were 1.42 in Bradford, 2.22 in Leicester, 3.33 in Nottingham, and 8.07 in Hull. The epidemic of scarlet fever in Hull has shown rapidly increasing fatality during the past three months. The fatal cases of diarrhœa in the twenty towns not only showed a marked decline from those returned in July and August, but were considerably below the average numbers for the season; the annual death-rate, which had been equal to 3.47 and 2.61 in the two preceding months, declined in September to 0.80, the largest proportional fatality occurring in Sheffield. Fever (principally enteric) caused 254 deaths in the twenty towns, of which 136 occurred in London, and 118 in the nineteen provincial towns; the annual death-rate from this disease, which did not exceed 0.20 in June and July, and 0.27 in August, further rose to 0.44 in September; such an increase, however, is not unusual in the autumn. The highest death-rates from fever during last month occurred in Leeds, Portsmouth, Hull, and Newcastle-upon-Tyne; the higher rate in the last mentioned town was due to an outbreak of typhus fever. The 228 deaths from whooping-cough were equal to an annual rate of 0.39 per 1,000, showing a further decline from 0.61 and 0.44 in the two preceding months. A still more marked decline occurred in the fatality of measles; the death-rate from this disease, which had been equal to 0.51 in August, fell to 0.28 in September, and 59 of the 89 fatal cases occurring in the nineteen provincial towns were recorded in Liverpool. The 71 deaths referred to diphtheria were equal to an annual rate of 0.12, which corresponded with that which prevailed in the two preceding months; 46 occurred in London, and only 25 in the nineteen provincial towns, which included 17 in Portsmouth and 4 in Birmingham. The fatality of the epidemic of diphtheria in Portsmouth showed an increase during September, no fewer than 108 deaths from this disease were recorded within the borough during the first nine months of this year. The deaths from small-pox in the twenty towns were 98 during the four weeks of September, against 170 in the five weeks of August, and the annual death-rate declined from 0.23 to 0.17; of the 98 last month, 94 occurred in London, and one each in Liverpool, Oldham, Leeds, and Newcastle, while no fatal case of this disease was recorded in any of the fifteen other large provincial towns. Judged also by the returns of the Metropolitan Asylum Hospitals, the prevalence of small-pox in London showed a further considerable decline during September. The number of small-pox patients under treatment in these hospitals, which had declined from 1552 to 557 during June, July, and August, further fell to 454 at the end of September. Of this latter number 90 were under treatment in the *Atlas* hospital ship, and 28 were in residence at the Convalescent Camp Hospital at Darenth. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 317, 152, and 104 in the three preceding months, further fell to 82 in September. The largest proportional fatality of small-pox in the metropolis during September occurred in the east and south groups of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year of age to births, averaged 125 per 1,000 in the twenty towns last month, against 234 and 200 in July and August; it was so low as 106 in London, whereas it averaged 143 in the nineteen provincial towns. This proportion ranged in the several towns from 96 and 104 in Portsmouth and Leeds, to 166 in Salford, 182 in Liverpool, 193 in Leicester, and 194 in Wolverhampton. It is noteworthy that notwithstanding the decreased fatality of diarrhœa, the rate of infant mortality in Wolverhampton and Leicester again considerably exceeded the rates that prevailed in any others of the twenty large towns.

The fatality of diseases of the respiratory organs, judged by the metropolitan returns, showed a slight increase last month, which was not, however, larger than is usual during September. The average weekly number of deaths referred to these diseases in London, which had steadily declined in the first eight months of this year from 513 to 144, rose to 159 during the four weeks of September, was, however, 14 below the average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London was equal to 2.2 per 1,000 in September, against rates declining from 7.2 to 2.0 in the eight preceding months. The death-rate from the same diseases during last month was equal to 4.8 in Liverpool, and 3.3 in Salford.

During the four weeks of September the causes of 243 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner. These uncertified deaths were equal to 2.3 per cent. of the total deaths registered. The proportion of uncertified deaths, which did not exceed 1.1 per cent. in London, was more than three times as large, and equal to 3.4 per cent., in the nineteen provincial towns. All the causes of death were duly certified in Brighton and Plymouth, and only one uncertified death was registered in Portsmouth; whereas the proportion of uncertified deaths ranged upwards to 5.0 per cent. in Bristol, 6.3 in Sunderland, 6.9 in Salford, and 7.5 in Newcastle-upon-Tyne.

Among the population of little less than a million persons living in the outer ring of suburban districts around London the annual death-rate from all causes during September did not exceed 13.2 per 1,000, against 18.3 and 17.4 in the two preceding months. The annual death-rate from the principal zymotic diseases also declined from 4.3 and 4.1 in July and August to 1.8 last month, and was little more than half the rate prevailing from the same causes within registration London. The fatal cases of small-pox in the outer ring were 5 during the four weeks of September, and showed a further decline from the recorded fatality in the preceding months. Infantile diarrhœa had ceased to be fatally prevalent, but the deaths from scarlet fever again showed an excess.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—At the last Annual Meeting the following officers were elected for the year ensuing.—*President:* Dr. J. W. Tripe. *Vice-Presidents:* Dr. Bristowe; Dr. T. Stevenson; Dr. Thursfield; Dr. Dixon. *Treasurer:* Mr. T. R. Lovett. *Hon. Secs.:* Dr. J. N. Vinen; Mr. S. F. Murphy. *Council:* Dr. G. Buchanan; Dr. Dudfield; Dr. Bath; Dr. Brett; Dr. Baylis; Dr. Corfield; Dr. C. Kelly; Dr. J. Stevenson; Dr. D. Thomas; Mr. F. M. Corner; Mr. Jacob; Mr. G. Turner.

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INTERNATIONAL MEDICAL CONGRESS.

STATE MEDICINE SECTION.

(Continued from page 109.)

GROUNDS FOR BELIEVING THAT THE TUBERCULAR DISEASE (PERLSUCHT) OF ANIMALS WHICH SUPPLY MILK AND MEAT FOR HUMAN USE IS COMMUNICATED BY SUCH FOOD TO MAN.

By C. CREIGHTON, M.D., Cambridge.

The grounds on which the contention of this paper rests, may be summarised as follows :—The tubercular disease of the bovine species, otherwise called the pearl disease, has certain well-marked characters which distinguish it. It is for the most part or primarily a disease of the serous membranes. The tubercles on the serous membranes are of large size, round or flat, often in conglomerate masses, joined together by cords, suspended by cords, tending to become hard and firm like shot, apt to occur on the hard margins of organs, *e.g.*, on the margins of the lower lobe of the lung. In their microscopic structure, a certain degree of vascularity, and a large number of giant-cells, are the distinguishing features. The lymphatic glands are almost always invaded by a similar new formation. The lungs very commonly are occupied with nodules of various sizes, which tend to soften in the centre, forming smooth walled vermicæ. The tuberculosis may extend to other organs and parts. A similar condition of the serous membranes has been observed in a number of tubercular cases, in man. The new formations on the serous membranes are more usually soft and membranous, representing the earlier stage of the pearl-disease ; but several cases have been observed in which the nodules have exactly the form and structure of the ordinary bovine pearl-nodules. An examination of the various diseased organs in these cases, shows that the disease is co-ordinate in them all ; that there is no primary focus of disease within the body, and that the virus must be referred to some extraneous source on the analogy of syphilis. In the spread of infective disorders, there is a principle of mimicry ; the marked products in the infected body tend to assume the form and structure that characterise the parent disease. It is on the morphological resemblance of the tubercular formations in the human body to the characteristic bovine tubercles, that the argument turns.

Dr. CARLO CUTUSI (Pisa) referring to the labours of Dr. Creighton, reminded the section that Drs. Portal and Lebert had also studied the disease in question with reference to the treatment sometimes adopted of using largely the milk both of cows and of asses, and Lebert specially had recognised the analogy between the scrofulous tumours and the tuberculosis of cows. It was difficult to form an opinion as to whether the affection had its origin from without, as in the case of syphilis ; but he could not but regard the researches which had been detailed, as having an important bearing on the use of the milk of animals as a food for man.—Dr. ALFRED CARPENTER (Croydon), whilst admitting that meat and milk from diseased animals kept in close, confined places, could not be regarded as a wholesome food, yet he felt confident that they were not likely to propagate tubercle. As regards meat, it was known that some 90 per cent. of animals used as food had tubercle to some extent, and no apparent harm resulted from consuming their flesh; and, on the other hand, tubercle prevailed mostly amongst the children of the poor working classes, who had but little milk.—Dr. GÜNTHER (Dresden) stated that experiments with tuberculous milk in Dresden had only led to negative results, and that phthisis did not appear to be specially prevalent where milch cows were found to be most affected with the disease.—Dr. THUDICUM also addressed the section.—Dr. TRIPE (London) gave instances of poisoning from beef-sausages and from dripping, which in their symptoms resembled the cases referred to in the paper, but no poison could be found, neither were any bacilli or fungoid growths. He believed that many cases of severe diarrhœa could be traced to a very similar cause.—Dr. BUCHANAN (London) referred to very similar results following on the consumption of beef at a town in Norfolk. Dr. EZRA M. HUNT (New York) stated that it was important in such cases to ascertain the locality from which the meat, used, for example, in sausages, was derived, and to find out whether it had not, during transport from other countries, or owing to exposure to other articles, become the nest for some foreign parasite. Sausage in the United States was a composite structure representing more than one animal ; and hence, for the purposes of State Medicine, it was very important to trace each article back to its exact source, in order to comprehend the import of the symptoms resulting from its consumption. Competent microscopists and veterinaries were working at the subject in America under the Government.

ON THE DISTINCTIVE CHARACTERISTICS OF AN ACUTE SPECIFIC DISEASE PRODUCED BY THE EATING OF PORK INFECTED WITH A SPECIES BACILLUS. ILLUSTRATED BY TWO SERIES OF CASES.

By EDWARD BALLARD, M.D., F.R.C.P., and E. KLEIN, M.D., F.R.S.

The first series consisted of some scores of cases occurring among persons who had, in the course of the five days (June 15th to 19th, 1880), partaken of refreshments provided at a sale on the Duke of Portland's estate, Welbeck, Nottinghamshire. The illnesses were traced to the eating of cooked ham, prepared in England from pork imported in a salted state from America. Four persons attacked with the disease thus induced are known to have died after a few days' illness. A good many, however, who partook of the same kind of food on the same days escaped illness. There was, before the occurrence of the first symptoms, an incubation period of twenty-four to thirty-six hours. The illness commenced in various ways, sometimes with chilliness or rigors, sometimes with giddiness, faintness, or pain in the chest, back, or abdomen ; but sooner or later there was pain in the abdomen, with fœtid diarrhœa and, usually, vomiting. Muscular weakness was an early and very remarkable symptom, and mostly there were headache and thirst. Various nervous phenomena were observed in some cases, such as cramps, convulsive flexions of the hands or fingers, muscular twitchings, pricking sensations, or numbness of the hands, drowsiness, hallucinations, etc. Very imperfect post-mortem examinations were made in three of the fatal cases, and, in the only two in which the chest was examined, pulmonary congestion was stated to have been found. The only portion of tissue that we had an opportunity of examining microscopically was part of a kidney. In this was discovered evidence of parenchymatous inflammation, and the afferent arterioles and capillaries of the Malpighian corpuscles were found plugged with emboli formed of masses of *bacilli*. Portions of one of the cooked hams used at the sale, and of a raw ham of the same American consignment, were examined microscopically, and in both was found a species of bacillus with sporules of the same ; the bacillus threads and sporules were in connection with the muscular fibre and in the inter-muscular tissue. Experiments were made on animals by feeding, or inoculation, or by both methods, and also by inoculation after cultivation of the bacillus material in the incubator. In all but a few instances disease was produced. The morbid condition most uniformly observed after death was pneumonia or pulmonary hæmorrhage ; other conditions were hæmorrhage into the liver, enlargement of the liver or spleen, pleuritis, peritonitis, etc. The second series consisted of fifteen cases of illness, one of which was fatal. All these persons had partaken of hot baked leg of pork, purchased on two several but consecutive evenings in February 1881, at a 'cook-shop' in Nottingham. The illnesses which resulted from eating this pork (with which gravy, prepared from the bones, pig's feet, and tinned beef, was dispensed), were of a precisely similar character to the illnesses in the earliest series, and were preceded by a similar period

of incubation. In this instance also many persons who ate of the food escaped illness, but when any family had partaken, all who, in that family, partook of the food were taken ill. In the fatal case, the following were the chief conditions observed on examination after death; extensive hæmorrhage into the tissue and air cells of the lungs, slight interstitial hepatitis and inflammation of Peyer's glands. In the kidney, the capillary vessels of many of the Malpighian corpuscles were impervious, the nuclei of the glomeruli being increased; some of the tubuli contorti contained extravasated blood, others of them casts. Bacilli were found in the blood taken from the heart, in the lung juice, and in the blood extravasated into the air-cells, etc., in the tissues of the stomach, ileum, spleen, and kidney, etc., and in the vessels of some of these organs. Animals inoculated with the blood, lung juice, and pericardial fluid, became diseased and some of them died. The morbid condition found after death in these animals corresponded with those observed in the animals fed or inoculated with the bacillus material of the ham in the Welbeck series, viz., pneumonia, with or without pulmonary hæmorrhage, peritonitis, pleuritis, or enlargement of the liver and spleen. Similar results also followed the inoculation of material obtained by cultivation of the blood and lung juice. Bacilli were found in the blood and exudations of some of the inoculated animals, as well as in the purulent matter of tumours found in two of them at the seat of inoculation. Unfortunately in this instance none of the food to which the illness was attributed was obtainable for examination. It is submitted that by the description of these two series of cases an acute specific of disease has been defined which has not been defined hitherto, and it is suggested that such cases of disease as have been heretofore noticed by observers have been regarded in the light of cases of poisoning (as by sausage, etc.), whereas there are marked distinctions between the two classes of cases.

On Some Original Researches Respecting Meat-Poisoning.

By Charles Meymott Tidy, M.B., F.C.S., Professor of Chemistry and of Forensic Medicine at the London Hospital.

The paper described a case of poisoning in five persons (none of which terminated fatally) from eating pork sausages. The sausages were carefully examined microscopically, but nothing was found by this method of enquiry to throw any light on the effect produced. By chemical treatment well-marked crystals were obtained from them. The action of these crystals was tested on two mice, both of which died within twenty-four hours. The post-mortem examination of these mice will be fully described. The author, admitting that many cases of the injurious effects arising from meat may be, and probably are, due to the presence of some of the lower forms of organic life, contended that in certain cases the symptoms point to some alkaloidal body as the cause of the mischief. The paper then detailed a series of experiments on the physiological action of alcoholic extracts of human stomachs, taken from the bodies of persons who have died from different diseases. The experiments show that some of these stomach extracts are exceedingly poisonous, whilst others are apparently inert. The post-mortem appearances of the mice poisoned with these stomach extracts were given. From the poisonous extracts the author showed in some cases, but not in all, that a crystalline body may be recovered, by treating the alcoholic extract with chloroform. The author then discussed the probable origin of this poison, and then endeavoured to connect the latter series of experiments with the injurious effects produced by the sausages.

The Influence of Milk in Spreading Zymotic Disease.

By Ernest Hart.

The author submitted an extract, giving in a tabular form particulars of 71 recent epidemics due to infected milk, that have been recognised and made the subject of detailed observations in this country, 67 of them since the Marylebone milk typhoid epidemic, traced and reported by Dr. Murchison and the author, in 1873. The particulars of the epidemics were given under the following headings. 1. Date of outbreak; 2. locality; 3. reporter; 4. total number of cases; 5. deaths; 6. number of cases amongst drinkers of infected milk; 7. percentage to total cases (col. 6 to col. 4); 8. number of families supplied by milkmen; 9. number of such families invaded; 10. percentage (col. 9 to col. 8); 11. sanitary circumstances of farm or dairy from which milk was derived; 12. exciting cause of outbreak; 13. circumstances implicating milk; 14. facts showing special incidence of the disease; 15. references to sources of information. The three diseases which have as yet been recognised as capable of being spread by milk are typhoid fever, scarlatina, and diphtheria. There is nothing in the analogy of epidemics to limit the list permanently to these; and already there are indications of other cognate diseases being spread by the same agency. The number of epidemics of typhoid fever recorded in the abstract as due to milk is fifty, of scarlatina fourteen, and of diphtheria seven. The total number of cases traced to the drinking of infected milk, occurring during the epidemics, may be reckoned in round numbers as 3,500 of typhoid fever, 800 of scarlatina, and 500 of diphtheria. As regards typhoid fever, the most common way in which the poison has been observed in these epidemics to reach the milk, is by the soakage of the specific matter of typhoid excrements into the well-water used for washing the milk-cans and other dairy purposes, and often, it is feared, for the dilution of the milk itself,—for which, in official reports, 'washing the milk-cans' has become a convenient euphemism, advisedly employed to avoid raising unpleasant questions. In twenty-two of the fifty epidemics of typhoid fever recorded, this is distinctly stated by the reporters to be the case, and in other cases it was more or less probable. When a dairy is unwholesomely or carelessly kept, there is obviously a great variety of ways in which the poison may reach the milk. (Nnmerous instances of this kind were given.) *Scarlatina* being almost invariably spread by contagion and by the inhalation of the bran-like dust which is thrown off from the body during the disease, we should expect in epidemics of milk-scarlatina to receive evidence of this dust having access to the milk; and in the majority of recorded epidemics it was found that persons employed about the dairy operations were in attendance at the same time on persons sick of scarlatina. In none of the seven recognised outbreaks of *diphtheria* due to milk, has it yet been possible to trace the exciting cause of the outbreak, though as to the disease being spread by milk there could be no doubt whatever. It has indeed been suggested whether a disease of the udder of the cow, called 'garget', may not so affect the secretion of milk as to give rise to diphtheria in the human subject. So far, this notion is a mere conjecture unsupported by fact. The great majority of the cases give statistical as well as experimental support to the conclusion that the responsibility of the epidemic lay with the milk. It is upon the largest drinkers of the milk (those, namely, who, consuming the greatest quantities, have a correspondingly greater chance of imbibing disease germs), that the incidence of the disease chiefly falls. Thus young children (ordinarily little liable to attacks of typhoid), who are accustomed to drink milk largely in the raw state, domestic servants, who after children, drink the most raw milk, and large milk drinkers of every rank and station, furnish by far the largest quota of cases in each epidemic. People, too, who drink exceptionally of the implicated milk are attacked, although the milk taken at their own houses is derived from other sources. The houses invaded during the epidemics are found to be commonly of the better class and in healthy situations. The poor, who take very little milk, and that only in tea or coffee, commonly escape the disease. The striking fashion in which the disease 'picks out' the streets supplied by the implicated dairy, and the houses in those streets receiving the milk, is noteworthy. People in adjacent houses, and who drink milk supplied by different retailers, escape; and when supplies from two sources enter the same house, the disease

only attacks those drinking that from the infected source. The contemporaneous invasion of so many households at once can only be explained on the hypothesis of a common cause acting on a particular set of persons, and on no others.

Influence of Various Articles of Food in Spreading Parasitic, Zymotic, Tubercular, and other Diseases.

By Francis Vacher, F.R.C.S., L.R.C.P., Medical Officer of Health, Birkenhead.

In stating the subject, Mr. Vacher desired to emphasise the word 'spreading'. As was well known, there was a large number of diseases which might fairly be said to be produced by imported food, as when scurvy followed a diet of salt pork and ship's biscuits, or when eczema appeared in a subject whose diet had been meagre and unvaried. The diseases, however, which there was any good ground for believing might be *spread* by means of food were far less numerous, still they were diseases of frequent occurrence, and belonged to three distinct orders—miasmatic, parasitic, and tubercular. Food might spread disease in three ways:—1. It might itself be in a pathological condition. 2. It might serve as a culture medium in which disease germs were nourished and multiplied; or 3. It might serve simply as a nidus in which such germs rested. The foods which alone could spread their own diseases to the subjects, by whom they were ingested, were necessarily meat or milk, or their derivatives. There was abundant evidence in support of the view that foot and mouth disease might be spread to the human subject by means of milk. Nor was this surprising; as large vesicles often formed on the udder, and these got ruptured in milking, the result being that the specific contagious liquid of the disease was mixed with the milk. There was also evidence not less abundant, though in some respects less satisfactory, of tubercle being communicated to children who had been fed on uncooked milk from tuberculous cows. As regards meat, there was evidence that a specific disease might be communicated to man by the ingestion of meat tainted with splenic fever, or anthracoid disease; and erysipelas (a common symptom in many animal diseases), it appeared, might spread to man by means of flesh from a diseased carcase. The only other diseases which could be spread by means of meat, where those indicated in the animal by the presence of cysticerci and trichinæ. Latterly there had been a report that cholera had been spread from swine to man by means of lard made up as butterine, but no facts in support of the statement had been produced. It was probable that almost any perishable food might occasionally serve as a culture ground or fluid for disease germs—especially nitrogenous food. It might be that a little water, a little ammonia in a form readily assimilated, and a temperature not too low, was all that was necessary for the sustenance and multiplication of the low forms of life constituting the germs of some diseases. So little was positively known about the nature of these germs and their manner of reproduction, that we had to be most cautious in receiving statements in reference to them; yet some recorded facts were scarcely explicable on any other theory, than that certain germs were capable of growing and multiplying outside the body of the subject from which they were derived. The *materies morbi* of enteric fever and cholera, and kindred diseases, were contagia, and almost certainly capable of being nourished and bred outside the body; and other contagia doubtless possessed the same faculty, though the proof of its exercise was less clear. Considering that the organic matter present in nearly all water was sufficient for the maintenance during active generation of countless organisms, it was surely conceivable that animal fluids such as milk and serum should prove equal to the support in active life of bodies of so simple a form that they might be regarded as composed of undifferentiated protoplasm. That disease germs, ordinarily so-called, should live and propagate on or in vegetable food seemed less likely from analogy; but it was a known fact that the spores of parasites affecting the human subject may be developed on plants. The influence of various foods in spreading disease was far more considerable when food was simply a passive agent, carrying contagion. Not only meat and milk and their derivatives; not only bread and confections; but the large class of supplemental foods coming under the term groceries, were doubtless occasionally in this way carriers of disease. This appeared to be partly due to the ignorance and uncleanly habits of small shop keepers; partly to people in indigent circumstances being constrained to resume their ordinary avocations at too early a time after suffering from infectious disease; and partly to the apathy of the whole community as regards ordinary sanitary precautions, and a habit of eating many foods uncooked, or imperfectly cooked. Thus, milk got infected through the milkman having children with the measles in the parlour behind his shop; bread through the baker being a convalescent from scarlatina; and sugar, through the grocer's apprentice having returned to work too soon after an attack of small-pox. Although disease might thus be spread by food in three ways, its influence in disseminating disease might be easily exaggerated. Books, letters, clothes, public vehicles, would all serve as carriers of infection just as well as food; and such germs as were capable of active life outside the body, could propagate no less in middens and foul water than in milk. The danger, however, such as it was, must not be ignored, but resolutely faced, and every exertion made to reduce it to a minimum. The measures which, in the judgment of the reader of the paper, appeared to be necessary to this end, were:—1. A more intelligent and scientific system of meat inspection. 2. Giving effect generally to the Dairies and Milk-shops' Order. 3. The provision of free hospitals for infectious convalescents. 4. The thorough cooking of all meat or milk to be used as human food.

The Prevention of Trichinosis.

By Dr. Guilherme José Ennes, of the Royal Academy of Science of Lisbon.

Conclusions:—1. The complete prohibition to import pork, whether fresh or preserved, from countries where trichinæ are known to prevail, appears to us a course which is fatal to free international commerce and to the public food supply, as also a grave medical error, and a needlessly heavy privation to the poorer classes. 2. Instead of such absolute prohibition, a constant and active supervision and inspection of all supplies of pork exposed for sale, should be inaugurated. 3. In its character of an acute gastro-intestinal affection, produced by the presence of the parasite introduced into the system, trichinosis may be cured; in its state of general distribution in the interior of the muscles, the possibility of cure needs confirmation. 4. A microscope magnifying 100 diameters is the only logical means of determining the investigation of the subject, and of avoiding the dangers attendant on the consumption of pork. 5. All meat recognised as containing trichinæ should be conveyed to the knackers (l'équarissage); and all pigs, living or dead, found to be infected, should be destroyed by cremation. 6. Thorough cooking at a high temperature affords a sure guarantee against the introduction or emigration of the parasite into the tissues. 7. The fatal cases always result from the consumption of imperfectly cooked meat.

The Influence of International Measures for Maintaining the Good Quality of Articles of Food and of Drink.

By Dr. Louis Grosz de Csatáé, Secretary to the General Council of Public Hygiene for Hungary.

1. In the interests of public health all civilised states ought mutually to guarantee the good quality of exported articles of food. 2. The treaties to be adopted can never embody measures which contravene the requirements of public health. 3. The question of food provision should be considered as an international one, the result being that, opposition on health grounds being set aside, all difficulties will cease. 4. It is not creditable that science should serve as a pretext for political and commercial interests; and scientific men ought never to urge anything but the pure

ole truth in all questions relating to the importation ortation of articles of food and drink. 5. Similar uld everywhere be adopted in order to deal with d adulteration. 6. Since several European states ., Hungary—have prohibited the importation of n pork, the United States can secure the withdrawal prohibition by adopting the international measures have to propose.

ADULTERATION OF FOOD SUPPLIES: ITS CAUSES ND EFFECTS; MEASURES OF PREVENTION.

WALTER DOUGLAS HOGG, M.D., etc., Paris.

having shown the advancing progress made in the ion of food-supplies in France, the author reviews lation of foreign countries, and especially that of , which is intended to deal with adulterations and it practices. He concludes by propounding a bill i clauses, which will protect the interests both of ic and of the trader. This bill will shortly be laid ie French Chamber of Deputies.

NCE OF FOOD ON HEALTH AND DISEASE AMONG HE WORKING CLASSES IN OUR COLONIES.

By GAVIN MILROY, M.D., F.R.C.P.

bject of the paper is to draw public attention to a which much concerns the true welfare of our , in an economic and political as well as in a sani- medical point of view. No community can be said to be in a really sound or thinking state, if ical powers of its labouring classes are at a low of vital energy, and if there be always an exces- unt of mortality from such diseases as are plainly e of marked debility and deterioration of healthy . The evidence—on which the illustrative *data* in proof of the several statements in the paper l—has been derived from direct personal observa- he case of the two West Indian Colonies, and ni-official communications in the case of the two in the Pacific.

ERNATIONAL CONDITIONS OF ADMISSIBILITY TO PRACTICE.

BY W. ACLAND, M.D., F.R.S., Regius Professor of Medicine, University of Oxford.

e there conditions under which one civilised country ive to the holders of foreign diplomas privileges those conferred on possessors of her own? 2. hese conditions necessarily imply examination? 3. ne conditions between foreign countries be the same en a mother country and her colonies? 4. Should itions be reciprocal, or can a country properly edom which is not accorded to her practitioners

ARKUSOVSZKY (Buda-Pesth) explained that any in his country could prove that he had followed um, and passed examinations corresponding with uired in Hungary, was only compelled to pass xamination as would suffice to prove his identity. ILLINGS (United States) explained that in his he regulation of the practice of medicine came e jurisdiction of the individual States, and not of ral Government; and so long as this was so, no onal agreement could be entered into by them. d that in all the States in which such regulations orce such diplomas as would suffice to enable a man to practice in this country would also entitle ractice in those States.—Dr. VAN OVERBECK DE (Utrecht) strongly supported Dr. Acland's con- and explained that physicians practising near the f the Netherlands, Belgium, and Germany, were actise in the adjoining countries within certain limits.—Dr. DIFFERUEZ (Jumet) having advocated y, Dr. DE CHAUMONT, F.R.S. (Netley), urged trade, and not reciprocity, should be adopted in this matter. He could, however, well conceive that so long as we had in this country nineteen licensing bodies and sixty-two different medical titles, foreigners could not understand their value or meaning; and he trusted the time was not far distant when we might have an examination which would suffice to show that its holder was an educated man, who was fit to practise in this or any other country. —Mr. SAVONA (Malta) drew attention to the serious disabilities under which colonial medical graduates were placed when they arrived in the mother country, none of their degrees being capable of registry by the General Medical Council.—Dr. THORNE THORNE (London) read a communication which he had received from the Melbourne University, in which the treatment to which the colonial universities were subjected by the mother country was strongly adverted to; and it was contended that this treatment was neither warranted by the character of the instruction given to medical graduates in many of our colonies nor by anything else. Indeed, whilst a practitioner holding any British diploma was free to practise his profession in any part of Australia, a colonial graduate who sailed to England as surgeon to a passenger vessel was not allowed in the mother country to act in the same capacity as regards an outward-bound vessel.

PRECAUTIONS TO BE TAKEN IN MEDICAL NOMENCLATURE AND CLASSIFICATION TO GUARD AGAINST FALSE STATISTICAL CONCLUSIONS.

By A. R. RABAGLIATI, M.A., M.D., Bradford.

1. Objections to the received classification and nomenclature. 2. Need for a formal medicine as distinguished from the ordinary or applied medicine. 3. Three classes of diseases proposed, according as they are due to organic matter, to inorganic, and to long continued causes. 4. The steps in all sets of diseases essentially three, viz., depression, reaction, depression again. 5. Functional or symptomatic names entirely to be discarded, and only pathological or etiological ones to be allowed. New names suggested. 6. The aim of doctors would thus be to discover the part affected, the cause of the affection, and to name the disease accordingly.

SEWAGE IRRIGATION A SANITARY SUCCESS.

By ALFRED CARPENTER, M.D., Croydon.

The following propositions were supported by evidence adduced from the continuous application of sewage to the Beddington Sewage Farm for the past twenty years. 1. That the application of sewage to land in close proximity to dwelling-houses is not injurious to the health of the inhabitants of those houses. 2. That the judicious application of sewage to land will satisfactorily cleanse the effluent water, and fit it for discharge into any running stream. 3. That vegetable products from fields continually irrigated by sewage are satisfactory articles of food for animals and man; that animals fed entirely on sewage produce are as healthy as similar animals fed on common agricultural produce. 4. That the excretions of persons suffering from epidemic or infectious diseases when spread as sewage on sewage farms do not tend to produce material capable of setting up similar diseases in those working on, or exposed to the influence of those farms. 5. That the changes which take place in sewage, when thus treated, are in a direction contrary to that which is necessary to be taken for the development and spread of parasitic and zymotic disease. 6. That these premises being proved, we may infer that sewage irrigation, properly conducted, in close proximity to dwelling houses is sanitarily safe. That the pecuniary recompense for residential damage, which is claimed from Local Authorities, who propose to employ irrigation for the purpose of cleansing their sewage, is based upon false premises. This claim has hitherto been the means of preventing the commercial success of sewage farms; it is one which the interests of sanitary science require to be steadily objected to, as not having any foundation in fact. 7. That in consequence of the peculiar productiveness of sewage farms, it is wise political economy

to encourage their formation in the neighbourhood of all those towns which have an abundant water-supply. 8. That it must be a condition of agricultural success, that the rainfall shall be, as far as practicable, separated from the sewage. That the rainfall to the river, and the sewage to the soil, is the best course of proceeding. 9. That it is a wise sanitary proceeding to utilise the sewage of towns on small areas at the outfalls from their own particular water-sheds (or as near as practicable), rather than to concentrate it, so as to make greater depôts, which, from their very magnitude, are more difficult to be disposed of.

SPECIAL REPORTS.

SOCIAL SCIENCE CONGRESS, 1881.

TWENTY-FIFTH ANNUAL CONGRESS HELD IN DUBLIN, OCTOBER 3.

LORD O'HAGAN'S ADDRESS.

Sanitary Reforms of the last twenty years in Ireland.—Public Health Acts of 1874 *and* 1878.—*Sanitary Expenditure of Local Authorities.*

ON Monday evening, October 3, the opening meeting of the twenty-fifth annual Congress of the National Association for the Promotion of Social Science was held in the Bijou Theatre of the Exhibition Palace, Earlsfoot Terrace, Dublin. There was a large attendance of Members and Associates. The President, the Right Hon. Lord O'Hagan, Lord Chancellor of Ireland, delivered the inaugural address, in the course of which he sketched the sanitary reforms of the past twenty years. In the year 1861, Ireland had, as its chief sanitary authorities, expiring parish vestries, clothed with antiquated powers, which had been vested in them so far back as the year 1818. There were some other bodies acting for similar purposes, under statutes which had once had equal application to England and Ireland, but had continued in action there after they were repealed in England. Five years after the meeting of the Congress, in 1866, the vestries were finally abolished, and the guardians of the poor were entrusted with sanitary powers identical with those existing in England and Wales. The change was great and wholesome, and was pushed to better issues when the Local Government Board was created in 1872. It was armed with large authority, and acted with energy and success. An Act of 1874 developed the sanitary system and brought it into full operation throughout the country. Under that Act the whole of Ireland is divided into sanitary districts, called urban sanitary districts and rural sanitary districts. The urban districts consist of towns having a population exceeding 6,000. The governing body of the town is made the Sanitary Authority. The rural districts consist of the Poor-law unions, and the boards of guardians are the Sanitary Authorities. There are 56 urban sanitary districts, and 163 rural sanitary districts; and in each of those districts a complete sanitary staff has been organised under the orders of the Local Government Board.

The medical officer of the dispensary district is, in all cases, the sanitary officer or medical officer of health. The principal duty of the Sanitary Authorities and their officers consists in the inspection of their districts, and in taking all necessary steps to compel the removal or abatement of nuisances, provide a proper supply of water, and construct, or cause to be constructed, where it may be necessar proper sewers and drains. The Public Health A of 1878 repealed all previous Sanitary Acts, r enacting, amending, and consolidating their provi sions, so as to comprise in one statute the entir sanitary law as it at present exists in Ireland. Th principal subjects dealt with in the Act are—sewer age and drainage, scavenging and cleansing, water supply, abatement and removal of nuisances, lodg ing-houses, markets and slaughter-houses, and in fectious diseases. Thus the scope of the statute is comprehensive, as the machinery for effectuating its purposes is complete. He rejoiced to say that its worth has been widely recognised. The increasing activity of the local authorities was demonstrated by the amount of their expenditure for the last six years, as it appears in the audited accounts of the Board; and still more strikingly by the amount of the loans obtained from the Board of Works, in those successive years, on the recommendation of the Local Government Board, 'for objects', in the words of the Public Health Act, 'which may be deemed sanitary improvements'. The sums had steadily increased from £37,584 in 1875-76 to £265,179 in 1879-80. In 1880-81 it had fallen a little below £200,000.

It was not easy to over-estimate the importance to Ireland of the sanitary work which is thus proved to have been done. It had been of double advantage, by relieving the poor at seasons of sore distress, and securing the permanent improvement of the health of the community. In a department so deeply affecting the comfort and the happiness of a people, Ireland need not be ashamed of the progress she is making and has made. And for her that progress was especially important. Health and social morals run closely together. Cleanliness and godliness are in alliance; and wholesome and commodious dwellings are important instruments of civilisation. The squalidness of his home drives the artisan for light and solace to the public-house. The mud cabin, with its single room and crowded foulness, is not very compatible with the formation of ordered industry; and, save in a country still marvellously pure, its inmates would be subjected to many dangers. It is of great consequence, for reasons like these, which might be largely multiplied, that our sanitary work should extend not merely to lodging-houses, but, as far as may be, to the dwellings generally of the humbler classes; and that the English effort in that direction, which has been successfully prosecuted under the benevolent guidance of Lord Shaftesbury, should have wide and cordial imitation here.

Many will think that the President's description of the existing sanitary organisation in Ireland partook too much of the *couleur de rose*, but this is perhaps allowable on a festive occasion.

At the conclusion of the address, a vote of thanks to the President, proposed by the Lord Mayor of Dublin, seconded by Professor Bonamy Price, and supported by the Hon. Dudley Field of New York, was carried by acclamation.

On Tuesday and the following days the departments of the Congress met in their respective rooms in Trinity College.

DR. CAMERON, M.P., ON MICRO-ORGANISMS AND DISEASE.

On Thursday, October 6th, Dr. CHARLES CAMERON, M.P., Chairman of the Health Department, delivered an address on micro-organisms and disease

:h he rapidly sketched the great advance n this branch of medical knowledge during few years. After alluding to the observations teur, Lister, Chauveau, Klebs, Klein, and on the specific micro-organisms of chicken , splenic fever, ague, tuberculosis, hydro- , etc., he drew two very sound practical . In the first place, such facts showed the ty, from the standpoint of public health, of ng any person suffering from an epidemic or ious malady as a hot-bed swarming with living sms, which cause and spread the disease. disease germs are very tenacious of life, and minated most actively in some diseases when ient is convalescent, and when it is nobody's look after him. It would be better, there- spend money in securing the destruction of eeds of disease; and it should be the duty of lic sanitary authorities to provide convales- mes for patients recovering from serious in- diseases, where they might be taken care of ll danger of the propagation of infection by ad ceased. Secondly, the discoveries named the enormous importance of the study of ative medicine and pathology, which should ulated and aided by the establishment of re- d chairs in the great medical schools. It is y such knowledge that preventive medicine most rapidly and surely advanced.

H. Burdett on State Supervision of Hospitals.

Henry C. Burdett, F.S.S., read a paper on sirability of hospitals being placed under ipervision, in which he adduced a great mass ence in favour of this course being adopted. dministration of the hospitals as at present ted is so uncertain and unsatisfactory that is needed to secure amelioration in the ts of the poor. To facilitate a right judgment, furnish reliable data, Mr. Burdett had pre- a variety of elaborate and carefully compiled cal tables, based upon the published reports atements of the various institutions. These l that the cost of management in sixty-one l hospitals varies from 2½ per cent. at Cork per cent. at the Metropolitian Free Hospital; st per patient per week from 9s. 4d. at the County Hospital, to £3 os. 4d. at the Leeds al Infirmary. The special hospitals show startling discrepancies. Out of a total of beds for the whole metropolis, 3,486 are pro- by the hospitals situated within a radius of a nd a half from Charing Cross. At present London, with a population of nearly 1,000,000, es but one hospital, the Great Northern, with s; the East-end, with its river-side and manu- ng population of 1,100,000, is dependent upon ndon Hospital with 790 beds, and the Metro- Free Hospital with 20 beds, both of which conveniently situated for a large proportion of abitants. The West-end, with a population of , has but two hospitals—St. Mary's with 190, e West London with 60 beds respectively. ulation of nearly one and half millions on the side of the Thames has to rely upon Guy's 00 beds and St. Thomas's with 400 available The unsatisfactory condition of the present ient system, and especially of that in force at ge metropolitan hospitals, demands reform. present time more than a million people, or one in three, receive relief at the London hospitals. It is desirable that every hospital and medical institution intended for the relief of the suffering poor should be administered by a board of management, subject to periodical election by the governors, upon which board the medical staff of the charity should be adequately represented. An authoritative supervision over the administration, and a public audit of the accounts, of all such institutions are needed to secure a right distribution of medical relief, and a more economical expenditure of the funds entrusted to the boards of management. A public audit is absolutely necessary to check extravagance and to protect the public, which has at present but little or no voice in restraining reckless mismanagement. An authoritative supervision would prevent foolish squandering, the occupation of unhealthy and unsuitable buildings as hospitals, and would promote good feeling between the hospital authorities and the medical staff. The absence of organisation and combination amongst the medical institutions throughout the country materially lessens their usefulness. This is strongly enforced by the enormous and needless difference in the cost of management and maintenance of different hospitals. In the administration of the wards, so far as it affects the treatment of the patients, and especially in the management of the nursing arrangements, the medical staff should have an authoritative voice. Recent events have shown the public and the medical profession to be in substantial accord on this point. Unfortunately, in the majority of the large hospitals the nursing arrangements are under the control of a matron, aided by a nursing committee, and only indirectly, if at all, assisted by those alone qualified to direct—viz., the medical staff. Out of twenty-two hospitals having medical schools, there are but seven where this important department is superintended by a nursing committee upon which the medical element is represented. The importance of medical education, and the adequate training of the members of the medical profession, require an intelligent recognition of the relation of the hospitals to their medical schools, to ensure an improvement in such relations. Medical education in this country, however, almost entirely depends upon private speculation and haphazard enterprises whose success rests upon the preservation of a harmonious relationship between corporations with apparently separate aims. Should this harmony between hospital and school at any time be ruptured, the existence of the school becomes at once imperilled, thereby seriously endangering the interests of the public. During recent years the Metropolitan Asylums Board has built and opened some of the most extensive and complete of modern hospitals. These infirmaries afford a magnificent field for the treatment and investigation of disease, for pathological research, and for medical education. The appointment of a controlling authority, endowed with adequate powers to sanction, restrict, or prohibit the erection of a new or the extension of an already existing hospital or dispensary, was, he thought, urgently called for. The social and public aspects of the question of the right of government of our hospitals alone demand an immediate investigation, since it is not the sick-poor at all who are being benefited, but nearly the whole wage-receiving and industrial classes, a large proportion of whom are well-paid artisans.

Mr. Michael on Compulsory Notification of Infectious Diseases.

Mr. Michael, Q.C., read a paper advocating the compulsory notification of infectious diseases, and said that the system had been adopted in some towns under private Acts; but he desired to see the principle generally applied.

INSTRUCTION IN PLUMBING AND SANITARY ENGINEERING.

The following is the programme for classes in this subject for 1881-82 in the New York Trade Schools:

The course of instruction in Plumbing and Sanitary Engineering, will comprise practical instruction in the Manual branches of the trade, and lectures on the Science of Plumbing and on Sanitary Engineering.

The instruction is designed for beginners and for young men and apprentices learning the trade in shops. On the completion of the course those who are sufficiently advanced in both the science and practice of plumbing will receive a diploma. The course of instruction is also designed to qualify those attending it for the license from the Boards of Health of the cities of New York and Brooklyn, required by the 'Act to secure the Registration of Plumbers, and the supervision of plumbing and drainage in New York and Brooklyn.'

Manual Branches.

Instruction in the Manual branches will be given daily from 8 a.m. to 5 p.m., from December 1st to March 1st.

Instruction will be given by competent, practical plumbers, under the supervision of the manager of the schools, in the Use of Tools, Hot and Cold Water Supply, Waste Pipes and Drainage, Trapping and Ventilating, Fitting of Pipes, Boilers, Baths, Ranges, Water Closets, etc. The Workshop will contain all the appliances of a first-class shop, and will also contain samples of the different articles and materials used in the trade.

Instruction will also be given in such Mechanical Drawing as will enable the student to understand and lay out working plans, and in Book-keeping, Estimating, and the taking of Quantities.

Sanitary Engineering.

Lectures on the Science of Plumbing and on Sanitary Engineering will be given on Monday and Friday evenings during the months of January and February. These lectures will be delivered by Prof. C. F. Chandler, President of the Board of Health of the city of New York; Prof. Thos. Egleston, of the School of Mines of Columbia College, and by Mr. C. F. Wingate, Sanitary Engineer. The lectures will be illustrated by Drawings, Models, Experiments, and the Magic Lantern. There will also be 'talks' with some of the leading plumbers of New York, who have kindly offered their services, on good and faulty work, difficulties that have been overcome, etc.

Dr. Chandler will lecture on Atmospheric Pressure, Sewer-Gas, the Germ Theory, Water-Supply, and Disinfectants; Prof. Egleston on the Corrosion of Metals used in Plumbing; and Mr. C. F. Wingate on Practical Plumbing as applied to Houses and Public Buildings.

The charge for the Three Months' Course of Instruction in the Manual branches of the Trade will be thirty-five dollars. This charge includes admission to the lectures, and to instruction, if desired, in Mechanical Drawing, Book-keeping, etc. All materials used will be furnished free of cost; there will be no extras. The charge for the Two Mont of Evening Lectures and Instruction wil dollars; including instruction in Mechani ing, five dollars. All payments to be advance.

DISINFECTING BY STEAM.

Like other applications which the progress or the exigencies of the times have rendere apparatus for disinfecting have gradually be efficient, and our columns have borne testin various improvements as they have appeared. now call attention to the latest result of develop department. After watching the process thr can express a very favourable opinion of the eff this mode of dealing with infected material, w the object of freeing it from the simple presenc moth, or the organic germs resulting from us infectious disease. Hitherto the apparatus pose have been framed for applying dry heat or without the aid of chemicals; but the one are about to treat marks an important departu mer ideas, inasmuch as steam or moist heat is r the place of the dry caloric. The invention vidual who is in a measure connected with bringing practical knowledge to bear upon it, more effective for the purpose than that in a scientific theorist, and the present is an il point. Mr. Washington Lyon, the inventor an the steam disinfector, is a partner in the firm of M and W. Lyon, who, as we are informed, for two have carried on an important business in th Road as bleachers, cleaners, and calenderers of textile fabrics. Their trade has lain extensiv the large shipping companies, every particle linen, from bedding to a table napkin, has fr time passed through their hands for cleaning, d or renovating.

Thus Mr. Lyon's attention has been turned now recognised as one of the most importan questions of public health. So far back as the when cholera was doing its worst in the metropo elected Chairman of the Committee formed in hi trict (where at one time it threatened to become s endeavour to arrest its progress; and from his c with the business before-named, he was not only e offer valuable advice, but assisted materially tributing disinfectants gratuitously, and helpin that the knowledge of the day enabled hin battle with the disease. From that time his were turned to the subject; but it was some three years since that he brought th actual practice. One of the firm's principal client steamship company, who carried a great numbe grants, had become so infested with vermin tha prejudicing their interests very materially, and passengers were seeking other means of transport means that could be suggested had been tried the ships, and as much as £1,000 had been e on one, between voyages, to rid her of the noc truders, but she had scarcely passed down Cha her outward voyage before matters were as before, and Messrs. Lyon were appealed to, on turn home, to render assistance. Mr. Lyon ha interim completed his first disinfector, and had pr proved his ideas were correct, and he very soon cated the vermin from the ship by the means presently describe. We shall not trouble our with all the details of the first experiments, troduce them at once to the apparatus in its co form, and as now in actual use at the Old Ke Works, the *Endymion* hospital ship, and el The subjoined engraving shows the disinfector, for removing from place to place, which can be done with the assistance of one horse. The are manufactured for the patentee by Messrs. Alliott, Fryer, and Co., the eminent engineers

.ouen, who are themselves makers of ap-
'oying the refuse of towns, etc., several of
being now in successful operation in some
land towns in the North. The disinfector is
: Low Moor iron, is oval in form, and has an
acket, into which the steam is first admitted,
lrying and heating the cleansing chamber.
:, the articles to be disinfected are placed in
)or is closed and hermetically sealed, and
ieans of another pipe carried through the
l into the interior chamber. Gradually a

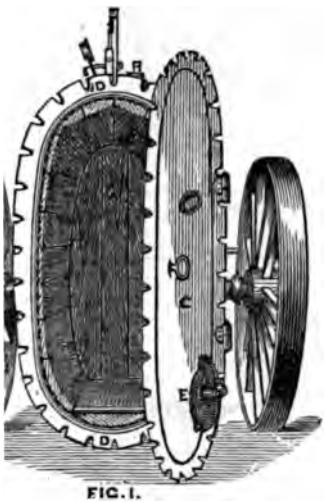


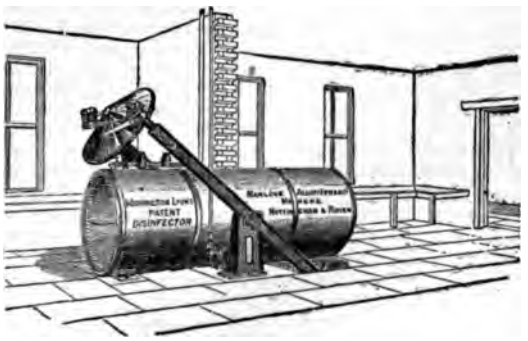
FIG. 1.

)n the outside, is seen to rise, registering
: pounds, ten pounds, and so on, pressure
quare inch, until twenty pounds are attained,
ees Fahrenheit; the pressure in the outer
:en raised to 30lbs. By this time a half hour
ipsed, when the steam is turned off from the
nber into a well or tank, or may be discharged
iere; a few minutes more are allowed for the
ne thoroughly dried, which is accomplished
: steam in the jacket or casing, the door is
· articles taken out as soon as the heat allows
led. This is the sum total of the process, and
o inquire into its effects, and what advantages
r the hitherto commonly adopted plan of
: without the aid of chemicals. It is a fact
t very few fabrics will bear a dry tempera-
in 250 deg. Fahr.; beyond that they become
:ed, and are virtually destroyed. At the same
rpose of thorough disinfection it is necessary
legree; and the question arises, does that
ctually attain the desired end? Recent in-
:e proved that it does not, and it is not cer-
;hest amount of dry heat to which it is safe
fabrics to, does not tend, if destroying in-
(which is also problematical), to assist to
: to maturity the germs of life in the ovum.
:, and we can scarcely refuse to do so, does
i be utilised at so much higher a tempera-
esired object? Of this there is not a doubt.
if constant work, in which articles of the
:ous description, and in almost all stages of
i, either from disease or other causes, have
)on by this means, sometimes under the actual
eminent professional men, at others by the
of the patentee himself, have proved the
:a. The microscope has been brought into
· disinfection, and has shown conclusively
of life, bacteria, etc., were to be found.
l grubs or insects have been utterly destroyed
d, while ova or eggs have become melted,
oyed. But while effectually accomplishing
ion, the Lyon disinfector does not destroy or injure the most delicate article submitted to its powerful agency. This is an advantage which must always enter into the calculations of those who, in their official capacity, are called upon to protect the public health, and at the same time to guard the public or local purse.

To show the necessity existing in some parts for an effectual means to arrest the dissemination of disease, we may call attention to a proceeding which took place in Hungary some few months since. Fearing the introduction of the plague from Russia, the sanitary authorities conceived the idea of adopting some plan by which letters and other imported objects might be rendered harmless. Many experiments were tried under the guidance of the most able professors, and some bacteria were subjected to the influence of dry heat, but it was found that while the highest heat considerably retarded decomposition, certain kinds of bacteria could not be destroyed, therefore it did not fully obviate decomposition. But to supplement this, it was advised that the maximum temperature should be applied in connection with vapours of carbolic acid, and then the living organisms were apparently killed. This only goes to prove what we ourselves know, that dry heat is not a certain safeguard for the disinfection of papers or letters.

Desirous to see the effects of steam upon delicate fabrics, as well as upon those articles acknowledged to be bad conductors of heat, such as made up bedding, etc. (and it must be remembered that anything treated by Mr. Lyon's process does not require to be taken to pieces or unmade), we recently paid a visit to Messrs. Lyon's works, and were present during the whole process. Not to recapitulate our former description, we may say that the steam brought from the boiler by an ordinary tube was admitted to the jacket. A mattress was placed in the receiver, and numerous articles of the most varied description, some of a most delicate character, such as silken tassels, borderings for curtains of varied colours, letters in coloured inks, books, and a quill pen that we are now using, were subjected to its influence. A thermometer was forced into the centre of the mattrass, and after the opening of the disinfector, registered 260 degrees Fahr. The small fabric articles appeared just the same as when put in, the gloss remained upon them, as if they had just left the loom, and the letters and books had in no degree altered, yet they had been subjected to a damp atmosphere under a pressure of nearly thirty pounds to the square inch, for nearly half an hour. The principal object of the outer casing is to prevent the condensation of steam in the disinfecting chamber, obviating the wetting that would otherwise occur to the articles under treatment, and the consequent deterioration of gloss and colour.

We now give a drawing of a disinfector for hospitals or any building where a permanent apparatus may be erected. As a safeguard against contagion, it is intended to be fixed between two rooms, one half in each, with a swing door to the disinfector, pivoted in the centre, and opening at either



end. The object here sought to be obtained is that perfect immunity from danger of contagion of the most remote character may be secured. The infected articles are placed in the apparatus in the one room by the individual who has collected them, and are taken out in an adjoining one, when

disinfected, by another person who has had nothing to do with them in their infected state.

A simple suggestion or two, and we must leave the Lyon disinfector to attain that position in the sanitary world that its merits deserve. Why should not such an apparatus on a smaller scale be made for the use of schools and other public institutions apart from hospitals, workhouses, etc. ? It would be of the most useful character on many occasions, and for varied purposes. It could, of course, only be employed where steam was obtainable; but now that hot-water apparatus and high pressure boilers are to be found in nearly all establishments where large numbers of persons live and have to be provided for, it would be an easy matter to utilise the steam that is now wasted, in operations of the character we have discussed.

THE DAIRY SHOW AT THE AGRICULTURAL HALL.

THE sixth annual dairy show of the British Dairy Farmers' Association, under the patronage of His Royal Highness the Prince of Wales, and the presidency of Lord Chesham, was opened on the 15th of September, and closed on the 20th. In every respect it may be said to be a worthy successor of those of past years, and from the large number of persons who visited it, the bulk of whom were evidently connected by some tie with the important questions of which it was the exponent, we may gather that a deep interest is being taken in all the matters the Society seeks to develop or accomplish.

The live stock we must pass over as not coming within the area of our remarks, and we can but make a passing allusion to the improvement visible, in the opinion of the judges, in our stock of English cheeses, the manufacture of which, from some cause which we need not stay to inquire into, has of late years shown signs of decay. The stern rebuke administered to our British makers, by the increasing imports of foreign cheeses has, we may hope, not been without its lesson, and we trust that being now alive to the formidable rivalry with which they have to compete, each succeeding exhibition may find them recovering some of their lost ground.

One interesting feature connected with this year's show is that out of 488 exhibitors, there were no less than 260 who had crossed the water from the sister Island with specimens of Irish butter. Of these the county of Leinster contributed 84; Munster, 121; Ulster, 37; and Connaught, 18. Unmistakable pleasure was evinced at this inroad, and many well-wishers to Ireland were heard to express the hope that next year there may be many more. But it is with improved appliances and sanitary arrangements connected with the housing of the animals, and the forming into food of the produce they present us with, that we have more particularly to interest ourselves. Of these the model dairy is one of the most notable features to be discussed.

Mr. George Kent of Holborn, whose name in connection with articles of domestic utility and economy has long since been a 'household word', not only in the United Kingdom, but almost throughout the world, and who was the original patentee of the rotary knife machine, represented Mr. Edward Ahlborn of Hildesham, Germany, a gentleman who, as we may fairly say, takes the lead in the Fatherland as a manufacturer of dairy farming appliances, and who carried off the gold medal of the Royal Agricultural Society of England, at the contest for the making of butter at the Bristol meeting in 1878, a competition we watched with keen interest. Mr. Kent had a complete model dairy fitted up with Mr. Ahlborn's modern utensils.

Messrs. Bradford and Co., High Holborn, also exhibited a model dairy; and the Dairy Supply Association, Limited, Museum Street, Holborn, contributed two; the Antitropic Co., Stamford Street, S.E., and Renfield Street, Glasgow; Messrs. Thomas and Taylor, Lower Hillgate, Stockport; and Welford and Son, Warwick farm dairies, Bayswater, were also exhibitors in this class. The cleanly appearance of these erections, the walls being faced entirely with ornamental tiles, and the floor with quarries, is one of their most salient points, though utensils command our approbation from their improved shape and construction and the pure white ware employed.

Of butter churns there was a large assortment, most the leading makers being present. Taking them in order in which they appear in the catalogue, we had Wm. Waide of Leeds, with his patent 'Victoria' ch that has many admirers. This is a barrel churn, perfe clear in the inside, having no beaters, and is pivoted in centre, and revolves end over end instead of horizont as is the case with most barrel churns. The advan gained by this arrangement is that the entire end or li the churn can be taken off, and the butter more e collected, and the churn be more easily cleaned.

Messrs. Bradford and Co. exhibited their Patent Churn with removable dashers, a utensil having some c mendable points; George Llewellin and Son, Haverf west, their Barrel Churn, with an end-over-end eccer motion which it is claimed forms the butter quick Thomas and Taylor, Stockport, their Patent Hera Eccentric Motion Churn, with which they have taken m medals and prizes, including the gold medal of the R Agricultural Society of England; Mr. Edmund Richa son Kendal, a Barrel Churn, also a successful competi at previous exhibitions; and on the present occas Mr. Geo. Kent (Ahlborn's), the Antitropic Company, a Mr. George Hathaway of Chippenham, whose Bar Churn has been one of the most successful in the marke In appearance, as will be seen from the appended drawing

it is of the ordinary barrel shape, made of the best oak, the beaters are constructed on the 'Archimedean' principle, by which it is claimed increased agitation is given to the cream in churning, and a larger quantity of butter produced. The stopper is of improved construction, and is made to form a convenient and effective fastening, and a recent improvement consists of a large metallic mouth or bush, which prevents the woodwork from becoming displaced by swelling or changes of temperature, which adapts it for use in any country. The metallic mouth also secures an excellent fit and bearing for the stopper. Mr. Hathaway's greatest feat with his churn was at the meeting of the Royal Agricultural Society at Oxford, where, after an exhaustive trial, he made two pounds more butter than any other. At this exhibition Mr. Hathaway carried off the silver medal (first prize) for the best churn to make butter from ten quarts of cream, the second prize being awarded to Messrs. Thomas and Taylor, Stockport.

In another competition for churns holding fifty quarts, in which Mr. Hathaway did not compete, the first prize went to Mr. Richardson Kendal, a barrel churn, while Messrs. Thomas and Taylor had again to content themselves with second honours. Of what are usually called milk churns, that is, the large vessels used for transporting milk by railway, there was a large collection, some of them being made of steel, tinned in and outside, and in this department the Dairy Supply Association were prominent, being, we believe, the first firm to introduce the new article.

The Aylesbury Dairy Company, Limited, were also extensive exhibitors, and the most interesting portion of their display was probably the scientific instruments and appliances which modern research has brought to light for testing the quality of the lactic fluid. Among the many we may mention a variety of fittings for milk laboratory, comprising water baths, air baths, gas burners, chemicals, etc., a Lactobutyrometer for obtaining exact results as to fat, an apparatus for ascertaining the percentage of

cream glasses, or creamometers, and
ng on the subject.
hicles for the conveyance and delivery of
, a class of article which has of late years
tion, the collection was large and varied,
: may mention the productions of Messrs.
ey of Leicester, and Messrs. Hayes and
and an ingenious cart on low crank axle
turned in its own length, carrying four
h holding forty-five quarts, was shown by
f Newport, Monmouthshire.
our alluding to the many other ap-
, more or less connected with dairy farm-
only in conclusion congratulate the
cess of their exhibition.

N AËRIAL DISINFECTANTS.

RIS (*Dublin Journal of Medical Sciences*,
vocating aërial disinfectants, states that,
ised in the sick-room, they are positively
: carbolic acid, or permanganate of potas-
in small quantities in a saucer in the
s utterly worthless, so far as any effect is
is thereby produced on specific contagia,
ed being wholly inadequate to the object
disinfection, when resorted to, must be
ninutest details, just as carefully as when
h liquid disinfectants, and the proportion
and the size of the room it is proposed
ction, carefully balanced, so as to ensure
poison. Of all the agents recommended,
cid by far the most effective. The follow-
s repeated several times, and gave the
ime :—
well-cleaned copper wire were treated
ıtimetres of concentrated nitric acid in a
ibic capacity of fifty-three feet, yielding,
35 per cent. of nitrous acid. A saucer
ıdred cubic centimètres of decomposing
ll of bacteria, was placed in the chamber
l and copper wire mixture, and the effect
, reducing the activity of the bacteria,
as rendered strongly acid. The same
forty-eight hours, examined microscopic-
diminished activity. The bacteria were
d, and the fluid was free from all putre-
he fluid in another test-saucer, on the
paque and clouded with active bacteria,
lour being very offensive. Examination
howed still no tendency to the further
ıcteria, and the fluid remained quite in-
t-saucer having been introduced into the
urther addition of thirty-five cubic centi-
itric acid, gave evidence of considerable
: the lapse of forty-eight hours, and, no
e been quite corrected by a further ex-
rous acid fumes. Both these infusions,
e lapse of a week, showed changes for

ents, Dr. Norris is inclined to think,
in nitrous acid we have a chemical agent
he development and further reproduction
es, and which is therefore capable of de-

F GAS APPLIANCES AND ELEC-
GHTING AT ABERDEEN.

exhibitions of this character have been
yet to our northern kinsmen considerable
o everything connected with gas. The
nd high illuminating power of the gas
h of the Tweed has always been ad-
is no doubt that gas was more largely
aking the area of the kingdom into con-
has been, until recent years at least, in the southern portion. A strong reason exists for this interest in the fact that Scotland claims that it was one of her sons who first brought gas into use fully as a lighting medium.

William Murdoch, an Ayrshire millwright, in 1792, then resident in Cornwall, began investigations into the properties of gases which permanently established the use of coal-gas, though Lord Dundonald had previously, in 1787, lighted up the hall of Culross Abbey with gas evolved in working a patent for making coal-tar. But, coming to the scene of this exhibition itself, we find that, in 1806, Middleton Rettie, a manufacturer of the 'Granite City', as the Aberdonians are pleased to call their beautifully situated town, lighted up his works in Broad Street with coal-gas made on the premises, after reading a pamphlet then recently published on the new light. To the apparatus described in this work he added a small gas-holder, probably the first that had been adopted, and used Argand burners as well as jets; and, six years later, James Wright, a tinsmith in the same city, lighted his shop with coal-gas made in a retort in a fire-place at the back of the premises, and burnt it direct from the retort. This, however, was rather going backwards, but it helps to show how impressed the Scotch mind was with the advantage of the new light at a time when it was probably scarcely known. In 1824 the first gas company was formed in Aberdeen, and when we consider the isolated position of that city at the time, it shows that the spirit of progress was well rooted in the minds of her inhabitants.

The exhibition was of the usual character; gas heating and cooking stoves in all their varied forms and sizes were exhibited, but there were not many features on show that our readers have not been made acquainted with through the medium of our columns, either in special notices, or in connection with other exhibitions. About the only exception was the exhibit of Messrs. Strode and Co., of Osnaburgh Street, Regent's Park, London, who were conspicuous for their very meritorious inventions. The first of these, a bath-heater, is probably the most simple in construction of any now before us. Conical in form, it consists simply of two chambers; or, to make it more clearly understood, of two cones placed over each other, connected of course. The interior one is the heating chamber, and the interstice between it and the outer one is the water way, which, it will be understood, circulates all round the outside of the inner cone. By this simple contrivance the coils of small pipe usually brought into requisition in the so-called 'instantaneous water-heaters', which, sooner or later, must become furred or fouled, are dispensed with, and there is absolutely nothing to become disarranged, the only pipe used being the ordinary duct from the reservoir or cistern for conveying the cold water to the heater, which enters it at the bottom, and is discharged heated from the upper part by a short pipe to the bath. The second is a combined coke and gas fire, and is the more interesting from the fact that the introduction of this idea has been accredited to Professor Siemens, who, it will be remembered, recently brought out a fire of this description. Several fires on the model now exhibited by Messrs. Strode have, however, been in use in the house of the senior partner in the firm for the last four or five years. The bottom bar of the grate, or a supplementary one above it, is made of gas tube, and perforated with holes for the burner, and is fixed by a swivel joint at one side, so that it can be drawn outwards and entirely away from the fire basket while it is being emptied or refilled. The gas burner has only to be lighted, when, in a very short time, a bright fire is obtained, without wood, paper, or any attention whatever. Coke or anthracite coal is intended to be used, which obviates the smoke nuisance; but little ash is made; no poking or stirring is required; and the combination of the two tends to economy in use. The gas can be turned down or entirely off when the fire is well alight, and need only be used again in the event of the fire getting low. Although this invention has been in use so long, Messrs. Strode have only recently introduced it for general sale, and they do not wish to disparage Dr. Siemens' idea, which is different from their own in ar-

rangement, having a combustion-chamber and other little features this does not possess. But for a fire to economise time and labour this must recommend itself to all householders.

The third new article is Schönheyder's sanitary stove for burning gas under the most perfect conditions, for heating large or small apartments, conservatories, etc.; but as we hope to have an opportunity of illustrating this apparatus, we shall defer any description of it for the present. To ourselves, however, the great interest attaching to the Aberdeen Exhibition existed in the competition that took place in connection with the relative values of gas for lighting purposes, as against the electric light. A good display of gas burners of the most approved character was shown, Messrs. Sugg and Co., limited, Westminster, and Messrs. Geo. Bray and Co., Leeds, as usual, showing to great advantage, and the various lights they exhibited leaving nothing to be desired on the score of efficiency, while the powerful lamps for street lighting erected by both these firms in the quadrangle of Marischal College, where the exhibition was held, clearly pointed out to the assembled visitors that this can be effectually done without the aid of the electric light. But at a time when the public mind is so much engrossed with speculations as to what is likely to be the future of electric lighting, it will not be out of place to take a short retrospective glance over the last two years, in which Mr. Bray has played rather an important part. At that time Mr. Sugg had already introduced his large lamps with Argand burners for street lighting, but Mr. Bray had previously confined his operations to the making of gas burners, for which he had obtained a world-wide reputation. Foreseeing the current events were likely to take, Mr. Bray turned his attention to street lighting and the making of lamps, and he adopted power flat-flame burners in preference to Argands. The success his lamps have attained may be understood when we say that at the present moment more than 300 of them are in use in the streets of London, besides a large number spread over other towns in the kingdom, railway

stations, etc. We subjoin an engraving of one of the most approved form, hexagon in shape, and embodying all his latest improvements. Great thought has been expended upon these lamps, with a view to proper and complete ventilation under all atmospheric conditions and changes, and so making the most of the light at all times. The latest improvements introduced are such that the base of the column and its immediate vicinity are lighted equally with more distant parts. The top of the interior of the lantern is now covered by a white enamelled cover, giving a pleasing finish to the interior, and assisting in some measure as a reflector, and a double service has been added, which, in a cluster of four or five burners, enables all but the centre one to be extinguished, should a less light be required. But to return to the competition, Mr. Bray, confident of the powers of his own lanterns, was anxious to cross swords with some of the electric light companies; and, at the recent meeting of the British Association at York, an opportunity was offered him of testing their capabilities. In connection with the 'Brush' Co., certain streets were allotted to each for lighting, which were selected for the purpose by the authorities, because they intersected each other in the centre, so that by standing at the point of intersection, the full effects of each system could be seen. Those allotted to the Electric Light Company measured 500 yards, and were lit by fourteen lamps representing a candle-power of 28,000, while Messrs. Bray took 600 yards with twenty-five lamps of 2,560 candle-power; and the opinion both of the members of the association and the general public was that the gas-lighting was the more effective of the two. Next came the question of cost. An elaborate calculation was made by the manager of the gas company at York, who showed that Bray's powerful lamps could be burnt at a cost of seven-eighths of a penny per hour, including interest on capital, renewal fund, wear and tear, and the general expenses necessary to be taken into consideration, while the Electric Light Co. intimated their lamps of similar power would cost 2d. per hour without any of the expenses before named, and these facts induced the York Corporation to adopt the gas lighting in preference to the electric light.

At the Aberdeen Exhibition, a further opportunity presented itself of testing the power of gas against the 'Swan' system, which is an electric light of the incandescent order, and intended for interior illumination only. In appearance this is one of the prettiest lights electricians have as yet favoured us with, and a large number of them were distributed through the principal hall. Mr. Bray decided that two of his lanterns of the model we have illustrated, representing with 30-candle gas a total power of 480 candles, would be sufficient to light the hall thoroughly, and the Swan Company were invited to compete against them with fourteen of their lamps said to be of 20-candle power each, thus bringing the maximum power of each to the same standard. The representative of the Electric Light Company accepted the challenge, but his estimate of the power of their lamps had to be taken against the accurately ascertained power of the gas burners. The conditions of the contest were drafted by the Executive Committee upon the strength of a statement made by Mr. Allbright of the Swan Company one evening when seventy-seven of their lamps were lighted, that each of them was giving a light equal to twenty candles. It was arranged that fourteen of the electric lamps only should remain in the lower hall, where the gas lamps were burning, and the surplus number, sixty-three in all, were to be removed to other rooms, but to be attached to the outside circuit. When the first contest was about to commence, it was found that only thirty-five electric lamps were connected to the outside circuit, and the representative of the Swan Company, who denied having been informed of the arrangements of the committee, refused for some time to attach any more, but eventually put on twenty-one others, making a total of fifty-six, instead of sixty-three, as desired by the committee. The object of the executive in wishing to have the sixty-three lamps over and above the fourteen that were actually in contest was that, taking the estimate of Mr. Allbright to be correct as to their illuminating power when the whole seventy-seven were burning, no one should be given for objection on either side by having less number, and thus enabling more motive power to be expended upon them. After a little delay, occasioned by the insulation of one of the wires taking fire, the electric daylight

various stands were extinguished, and Mr. Bray's terns were left in undisputed possession of the hall, ; it up admirably, and to the apparent satisfaction y one during the fifteen minutes they were allowed . Now came the turn of the electric lamps, which ımediately started. For a few minutes, the light erior to that of the gas, when suddenly they flashed n abnormal extent, beyond the capacity of the ap- to retain, which was shown by the immediate ex- of one of the competing lamps, and of others on uit outside the room. The flash lasted about three , giving for that time a superiority to the electric ver the gas, and we need not go far to seek the But the heavy strain soon became apparent, the rent rapidly lower, and eventually settled down to a ınsiderably below the gas lights. Afterwards they ly recovered, but did not again equal the light the given uniformly during the time it was on. The was again renewed in the evening, when the electric vere tried first, but it was a general opinion that ht was manifestly inferior to that of the afternoon, efforts of the electricians to improve it was in- l. When the gas was lighted, the difference in the ıs immediately noticed, and its steady burning and ity of illumination was acknowledged on all hands. y safely say that, with the exception of the few when the abnormal flash was attained, at no time r contest was the electric lamp equal to the gas. antity consumed by Bray's burners was 46.8 feet r, costing 1.96d. for that period of time; but the the electric lights could not be obtained, Mr. All- having positively refused, in presence of members ommittee, to go into that question. This is not the e we have heard the same complaint uttered. But etermined, if possible, by those connected with gas, n it; and on the Saturday morning following the an indicator was fixed to the engine for the pur- obtaining the power used. The machinery was set n, and when the representative of the electric light d his lamps were at 20-candle power, the indicator that the engine was working at 12.7 horse-power. general opinion of those in the hall who had wit- the contests was that the light then attained idedly inferior to that given on those occasions. nps never attained the whiteness necessary for a light, but were of a yellow colour all the time the ns were being taken. From the information it was calculated that the fourteen lamps com- with gas cost 11.76d. per hour, against a total cost of d. per hour; and the latter had the great advantage e electric light of always burning with steadiness tainty. Had it not been for the gas, the exhibition ıave been in darkness on several occasions, owing lectric light at times going out suddenly. It was d to have had a display of the electric light in the ıgle, and the Brush Company had been invited to or that purpose. Mr. Bray had prepared for this tion also by erecting one of his powerful lanterns of lle power, but after seeing what he had to contend e agent of the company did not appear again for ys, and the exhibition of the arc light on this occa- a decided failure, though on whom to attach the is not our province to enquire. In stating these do so without prejudice. We have no interest y, but are desirous, in common with thousands of ıat each light should be exhibited to its best ad- and the cost of each fearlessly placed before the Whatever may be the future of electric lighting, there can be no two opinions that at the present costing much more than gas for the same illu- power; and we are glad to see that those who supply of gas in their hands are alive to the fact have a powerful competitor to deal with, power- because from its novelty, so to speak, for the uses to s promoters maintain that it can be applied, it can be successfully carried out) create one of the hanges in many features that the world has ever

We cannot close our remarks of the Aberdeen Exhibition without noting the liberality on the part of the authorities of the University of Aberdeen in throwing open their grounds for the purpose of holding the exhibition, and of the indefatigable exertions and general courtesy of Mr. Alexander Milne, the secretary of the Philosophical Society, to whom mainly the success of the undertaking was due.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

Adulteration of Food.

1880. *Horder* v. *Meddings*. "Sale of Food Act, 1875," s. 6.—Coffee adulterated with 75 per cent. of chicory—"Coffee" asked for by purchaser, after sale but before delivery. Vendor labelled it a mixture, etc.—On proof of which fact the Magistrate refused to convict—Case remitted to Magistrate, because he had not found whether the statement of the mixture was for the purpose of concealing "fraudulent" increase in the "bulk" of the article—Semble that it was—otherwise vendor's defence good. (44 J.P., 234.)

Mortuary.

1878. *Hansard* v. *St. Matthew, Bethnal Green*. Application by Vicar and Churchwardens for faculty to erect a mortuary and rooms for coroner's inquests on a part of a closed churchyard opposed by a non-resident Freeholder of neighbouring property, as contrary to ecclesiastical law—Application granted. (L.R., 4 P.D., 46.)

Defective Drains.

1881. *Kinnaird* v. *Smith*. House hired by plaintiff on defendant's guarantee that the drains were carried outside and were in good order—After entry, drains found to run inside and to be choked with sewage, causing serious illness to inmates—Action to rescind contract of hiring, and for damages in respect of defendant's misrepresentations—Agreement set aside by the Court, and damages to be assessed. (*Times*, May 16, 1881.)

Defective House Drains.

1880. *May* v. *Verity*. Action by assignee of a lease against intending assignee for specific performance of agreement to take a house—Defence that the drains were defective, and that the house was subject to an easement not clearly disclosed in the lease, to wit a duty to receive and transmit the drainage of adjoining houses—Judgment for defendant on last-named ground. (*Times*, Dec. 22, 1880.)

Mortuary.

1880. *Magrie* v. *Westminster (Duke of)*. Application by one Churchwarden for faculty to erect a mortuary in a disused London churchyard—Application opposed by the Rector, the other Churchwarden, and an adjacent landowner, on the ground that the proposed site was too near inhabited houses—Decision on the main question postponed to enable suggested alternative sites to be considered. (Consist. Ct., Lond.) (*Times*, August 23, 1880; July 26, 1881.)

Disturbance of Burial Ground.

1880. *Reg.* v. *Jacobson*. Disturbance of a disused unconsecrated burial ground, with a view to building operations, by digging up same, and indecently exposing human remains—Held that defendant was guilty of a "serious offence" against the law in submitting human remains to disturbance and indignity—Fine of £25 inflicted. (*Times*, Dec. 21st, 1880.)

Unwholesome Meat.

1862. *Reg.* v. *Jarvis*. A carrier can be indicted and convicted at common law for knowingly taking to market meat unfit for human food. (3 F. and F., 108.)

Rate Appeal.

1881. *Reg.* v. *Montgomeryshire JJ.* 6 7 Will. IV, c. 96, s. 6; "Union Assessment Act, 1864," s. 2—An Assessment Committee which has appeared at Special Sessions may appeal to Quarter Sessions. (50 L.J., M.C.,

52; [*Llanidloes* v. *Jones*] 44 L.T., 310; [*Newtown* v. *Jones*] 45 J.P., 407.)

HIGHWAY.

1881. *Reg.* v. *Williamson.* "Extraordinary expenses"—Defendant the only mineral owner using a road, all other owners sending their stone by railway—Defendant's traffic held not "extraordinary" merely because he made frequent use of the road whilst others preferred another mode of conveyance. (45 J.P., 505.)

PUBLIC LIBRARIES.

1881. *Royal Society of London, and Thompson, In Re.* Society licensed to purchase and hold lands in mortmain—On sale of a part, the purchaser objected that the property came within the "Charitable Trusts Acts, 1853 and 1855," and that the consent of the Charity Commissioners was requisite—Held that the case was within the exemptions of s. 62 of the former Act, which were not interfered with by s. 29 of the latter Act, and that therefore the consent of the Charity Commissioners to the sale was not required. (50 L.J., Ch. 344; L.R., 17 C.D., 407; 44 L.T., 274.)

RATING OF BRIDGES.

1881. *South-Eastern Railway Co.* v. *Lambeth Churchwardens.* Private foot-bridge sold to Metropolitan Board of Works to be thrown open to the Public—Held that the plaintiffs' liability for Rates thereupon ceased. (*Times*, Feb. 23, 1881.)

MORTUARY.

1879. *St. George's, Hanover Square, Burial Board* v. *Hall.* Application by Burial Board for faculty to erect mortuary and *post mortem* room in consecrated burial ground closed for burials—Application granted, subject to conditions as to use of disinfectants, hours of reception, etc. (L.R., 5 P.D., 42.)

HIGHWAYS.

1881. *Wallington* v. *Hoskins.* "Highway Act, 1878," s. 23—Cartage of stone—A waggon may be loaded with a weight which absolutely may be very heavy, and yet the weight may not be extraordinary within the statute if such weights are usual in the locality, and necessary. (50 L.J., M.C., 19; L.R. 6, Q.B.D., 206; 43 L.T., 597; 45 J.P., 173.)

POWERS OF LOCAL BOARDS.

1880. *Wakefield, etc., Banking Co.* v. *Normanton L.B.* Contract for reservoir to be paid for by instalments after certificate by engineer—Reservoir found faulty, and further payments refused—Action by Contractor against Board for balance—The debt assigned to a Bank—Action by Bank against Board—Defence that the original certificates had been obtained by fraud and conspiracy—This being proved, held that the Board was not liable to the assignees of the debt. (45 J.P., 79.)

SANITARIUM.

1880. *Watson* v. *Leamington College.* Proposed conversion of a villa into a sanitarium—Covenant in lease not to do anything which would be a "nuisance" or "annoyance" to the neighbourhood—Held that to use a house as a sanitarium would be to make it, if not a nuisance, certainly an "annoyance"—Injunction granted. (*Times*, Nov. 8, 1880.)

MM. Boutmy and Descoust have found (*Journal de Pharmacie et de Chimie*, 1881) that a cubic mètre of cesspool liquid, even after official disinfection, rendered eight cubic mètres of air fatal to animals immersed therein.

UNSATISFACTORY WARMING OF THE NEW WORKHOUSE INFIRMARY, MANCHESTER.—'Dr. Mouat, H.M. Medical Inspector of the Local Government Board, in his report of the Workhouse Infirmary says, that the warming of the wards is very defective, as shown in the very heavy mortality from lung disease, no fewer than 320 out of 789 deaths having been due to bronchitis, consumption, and inflammation of the lungs. Additional means of warming was urgently needed.'—*Manchester Guardian*, August 26th, 1881.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

SANITARY SUPERVISION.

Would you oblige me by answering the enclosed queries.

W. L., Inspector.

Referring to page 442 of SANITARY RECORD (May 15, 1880), I notice in section 1, that 'any owner or occupier within the district, who intends to drain into the sewers of the Authority, must give fourteen days' notice of his intention so to do, and such notice must be delivered with a fee of 5s. in each case for Surveyor's superintendence.' I conclude these regulations are framed by the Authority, under section 21 of the Public Health Act 1875. Has the Authority power to enforce this payment, should it be disputed by owner or occupier?

In this Rural Sanitary District a parochial committee with urban powers has been formed in one parish, in which a considerable extension of the sewers has been, and is still being, made. Can the Rural Sanitary Authority or Parochial Committee direct that their inspector should attend the meetings of the committee; and is it part of his duty to take levels, draw up plans, and generally superintend such sewerage works, without any remuneration; or is this duty included in section 13 of the 'General Order of the Local Government Board as to the Inspection of Nuisances, 1872'?

Has the Authority power to charge owners surveyor's fees for superintending the erection of buildings in such contributory place, where urban powers are in force; or if the surveyor be paid by salary, would it be a special expense on the parish?

[There is some difference of opinion as to whether a Local Authority can enforce a fee for the connection of house drains with sewers, but in the case above, as the Local Government Board seems to have authorised such a fee, the bye-law must for the time being be deemed good; though that board is not always trustworthy in its view of legal questions, various of its bye-laws, etc., having been upset by the courts of law.

We think it is certainly the duty of the inspector to attend meetings if called upon by his employers to do so. Similarly, we think it his duty to assist in levels and plans, so far as his skill or experience enables him to do so. If more calls are made on him in regard to such matters than he deems reasonable, he should remonstrate, or demand a higher salary, or plead ignorance and the necessity of some technical assistance.

The Local Authority has certainly no power under the general law to charge building fees in respect of new buildings. Such power has, in a few instances, been obtained by towns under special local acts.—ED.]

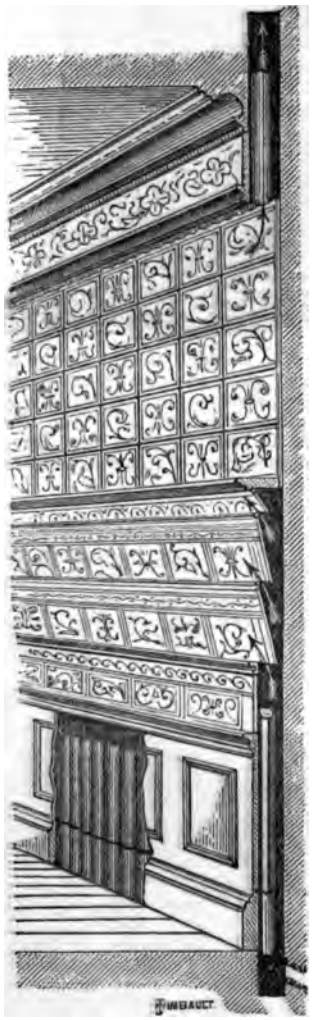
DIPHTHERIA AND FILTH.—Dr. John Morris reports the occurrence of six cases of diphtheria in one house. Five were attacked on the same day, the sixth four days afterwards. All presented a serious aspect from the beginning, and three died on the fourth and fifth days of paralysis of the heart due to the violence of the poison. The other three are likely to recover. The circumstances suggesting a local cause, an examination was made by the Health Department by direction of Dr. Steuart, Health Commissioner, which revealed a shocking sanitary condition of the premises. The yard was small, the privy being but twelve feet from the hydrant. The contents of the privy were running over into the yard and alley-way. The family cooked and lived in the basement; upon taking up the board floor of this, the ground was found covered with fæcal matter. The cellar was stored with old lumber, much of which was rotten and decaying— the remains, evidently, of some old building intended for use as fuel. A goat was tied near the back door, and there was a large pigeon-house, containing twenty to thirty pigeons, and in a filthy condition, just over the door. The family were dirty and offensive-looking, and the odour on entering the house was horrible. A child who subsequently played with the goat died of diphtheria.

SANITARY INVENTIONS.

RITCHETT'S NEW PATENT SYSTEM OF HEATING BY HOT-WATER OR STEAM.

No. II.

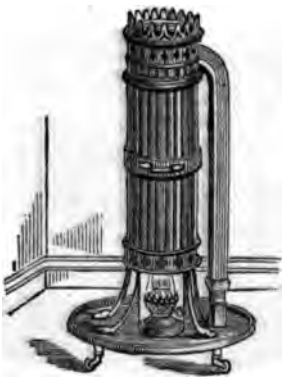
Continuing our remarks on this system from the SANITARY RECORD of September 15th, we have to deal with fig. 3 of the illustrations, which represents an adaptation of the invention for dealing with large surfaces of walls, including inlet and outlet arrangements, and consequent ventilation. It will be seen that a portion of the panelling or dado has been removed to show the corrugated heating chambers behind plates, which are carried along the entire length of the back. Internal or external air is admitted at the bottom or side, which, becoming warmed in its upward passage, is emitted into the room in the direction of the arrows

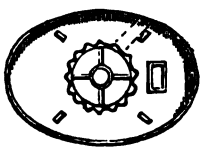


Inlet.

through a range of louvres, six or seven feet from the floor, made of the new metallic plates or tiles, painted to correspond with the style of decoration. These secure lightness, cleanness, and immunity from atmospheric changes. They are arranged so as to be adjustable by means of a simple thumbscrew, and being in sections, air can be concentrated on any one point or be diffused equally all over the area, and in small or large streams at will. This is calculated to keep the walls of rooms dry and warm, and to give greater effect to warmed air radiated from fires or other sources of heat, by preventing its too rapid absorption. These metallic plates will bear a jet of gas from a Bunsen burner being passed over them, thus destroying all germs of infectious disease when the system is applied to fever wards. The vitiated air is drawn out of the apartment by similar plates arranged for that purpose near the ceiling or cornice, and can be led away into flues, and the influx and efflux prevents draughts, enabling the air to be constantly changed without necessarily lowering the temperature, the louvre arrangements bringing this entirely under control. It is also noteworthy that should down-draught occur at the ceiling outlet, by sudden change of wind, opening or shutting of doors quickly, the air is warmed in entering the room, by having to pass over the heater plates at that point before it reaches the occupants. This can be seen in operation at the show-rooms, 23A, Maddox Street, Hanover Square, London, W. Fig 4 represents a portable heating apparatus for burning mineral oil, or gas may be used if preferred. This is made of one of the corrugated heating chambers formed into a circular pillar. It is three feet in height and one foot in

Elevation.





Plan.

diameter; yet, on account of the corrugations, a heating surface of about thirty feet is obtained, which is far larger than any stove of the same dimensions with a plain surface could supply. It is supplied with the descending flue for carrying off the products of combustion in connection with some chemical solution such as chloride of calcium, and which we described at length in our former description of Mr. Pritchett's patent invention. This is a pretty and comparatively cheap heater, and should command a good sale.

IMPROVED LEMON SQUEEZER.

Another little domestic appliance, in the form of an improved lemon squeezer, has emanated from the well-known firm of Groom and Co., Liquorpond Street, and is well deserving of notice. Hitherto the articles made for this purpose have, to our thinking, been rude and imperfect in construction, and not at all suitable for use in any but the culinary department of a household. The one of which we are about to treat is intended to be used in the dining room if required, and although made of block-tin and tinned iron, can also be manufactured in electro-plate for those who require a superior article. The subjoined engraving will enable our readers to clearly understand its application. The increased use of lemons in the beverages now becoming popular, such as lemon squash, etc., renders a really good lemon squeezer of great use in a household, and Messrs. Groom's invention fairly aspires to this; at the

same time, it may be used as a miniature tincture press, its action being rapid, certain, and accomplished with a minimum of power. The new lemon squeezer is made of a size to fit on the top of a tumbler, and has a perforated strainer at the lower part, of concave form, as shown by the dotted lines. The screw is connected with a presser of the same shape as the strainer, and is fixed to the body by three clamps having a bayonet catch. A lemon is cut in two, and one half is placed on the strainer with the cut-side downwards. On screwing down the presser, the top of

the lemon is caved in, or in plain parlance, turned inside out, every drop of juice passes into the receiver, but the pips cannot possibly pass through, and the pulp of the lemon is subjected to an equal pressure all over. Without doubt Messrs. Groom's lemon squeezer is a step in the right direction in domestic appliances.

AMERICAN FOLDING TABLE.

To the numerous American articles that are now to be found among us, the 'Folding Table', of which we append illustrations, will be found a most useful addition,

either for the sick room, for camping, or picnics, or for ordinary domestic purposes. It is light, yet strong and well made; some are finished with chess tops, have the different sections of three feet, or 'yard' upon them. Our first illustration shows it in use other, when folded up. This is effected by pl table on end, and pressing the two legs to th having first unlocked a catch and brace that ho firm, then serve the other two in the same manner assumes the form depicted. For invalid use, if in connection with a bed, one pair of legs only

the other end of the table resting on the bed. F fined spaces, or where an occasional table only is re it will be found most useful, always ready, and pu the way with ease when done with. They may be o of Messrs. H. L. Judd and Co., Fann Street, Ald St., whose advertisement of American novelties is ge to be seen in our pages.

MINERAL OIL HEATING STOVES.

Amongst the new portable stoves introduced present season, there are two emanating from th Light Company that embody some interesting an worthy features. Mr. Silber has done so much to

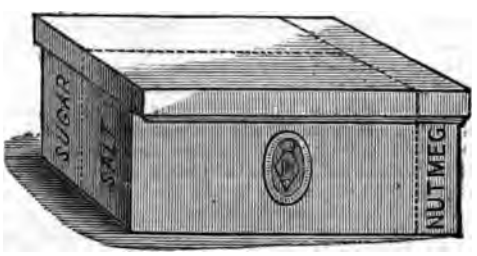
and improve lighting by means of mineral oil, t we have referred on former occasions, that anythi bearing his name is sure to be received with i Although there are one or two firms who have go

› heating stoves than Mr. Silber has done, the e about to describe was invented by him some since, though he has only recently offered it ıl sale. It may be termed a combination stove, ptable for cooking or heating at pleasure; and ısted of its cooking arrangements makes a very ıting appliance. We append an engraving of it :ing phase. It is made of cast iron, and well got sent out either Berlin blacked or electro bronzed, back, and top, being inlaid with embossed white les. The top tiles, it will be observed, are re- and boiling or stewing can be carried on when aken off. A good sized oven is provided in the which a small joint, poultry, or bread or pastry, well cooked as in the best constructed brick oven, ; this noteworthy feature, that the products from not enter the oven. The burners are located at ; of the stove, and the heat from them rises he fluted columns shown in the engraving, the olumns acting the part of chimnies as in a lamp, ›erfect combustion, and carrying the heat around and over the top, where it eventually escapes. it as a heating stove the oven door is taken off, s removed, and in their place a corrugated copper ›rojecting towards the front in the form of a V is The chambers at the sides where the lamps burn, ıss inserted, reflect their light upon the V-shaped and a very pretty effect is obtained, and the heat is sufficient to warm an ordinary sized room. nps burn under the ordinary conditions of a table with the further advantage that the heat has to much longer distance than in a simple luminary, ion can be taken to it on the score of imperfect ın, unpleasant effluvia, etc., from which it is per- . But the *chef d'œuvre* of mineral oil stoves has been attained by Mr. Silber in his combined nd iron heating stove, as illustrated below. This h exception of the burners and oil containers, is

tirely of ceramic ware, glazed in various colours. nted upon an ebonised stand with runners, so that e easily removed from room to room on the same 'o give the appearance of a glowing fire, strips of ıured glass are inserted in the front. It has two powerful burners, and these are made in the most approved manner, enabling every part to be kept scrupulously clean with a minimum of trouble. Perforations around the sides and back allow the cold air to pass in and escape heated from the top. The design is pretty, and the *tout ensemble* is altogether pleasing to the eye, and the heat thrown off most gratifying to the senses. We have given our opinion in favour of ceramic stoves in a former article in the SANITARY RECORD. Their heat-retaining properties are greatly in advance of iron or other metallic stoves, while cheerful and cleanly appearance are strong recommendations in their favour, and we confidently expect to see them take the place of other heat-giving appliances to a large extent.

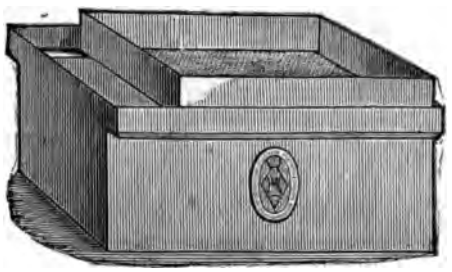
GROOM'S REGISTERED DOMESTIC CASTOR-SIFTER.

This useful little article is applicable to a variety of purposes. Although ostensibly designed for domestic use, it may prove equally handy to the chemist and druggist, or the medical practitioner who dispenses his own medicines. We shall describe it as it is intended for household purposes, and leave its other uses to be created by our readers. It consists of a small tin japanned box, the drawings showing it both open and closed. There are two sifting trays sent out with it, of different degrees of fineness, the coarser being intended for salt, and the finer one for castor-sugar. By merely moving the tray to and fro, any ingredient is rapidly sifted, and it is said that a half-dozen salt-cellars



Packed up.

may be filled and trimmed in one minute, and whatever is passed through it is naturally perfectly fine, and devoid of the almost inevitable little lumps, that are so objectionable. In addition, a nutmeg-grater finds a place in this useful little box, and the price of the article is so low, that it is

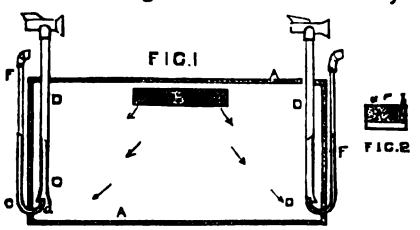


sure to become a favourite with all those who study comfort and appearance in the little appurtenances of the table.

AUTUMNAL LEAVES.—A novel feature of the approaching book season will be the production—in a new work by Mr. Francis George Heath—of a series of coloured plates representing autumnal leaves. The author believes that no book giving coloured figures of autumn leaves has ever been published in this country. The subject of Mr. Heath's new work, which will be published by Messrs. Sampson Low, Marston, and Co., will be further illustrated by full-page and vignette wood engravings which are being drawn for the work, and will accompany descriptions of some autumn rambles.

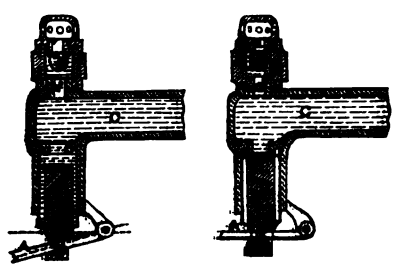
ILLUSTRATED SANITARY PATENTS.

162. (1881.) IMPROVEMENTS IN VENTILATING BUILDINGS, ETC.: T. ROWAN, RYDE, I. OF WIGHT. [6d.]—This appliance is for insuring a constant and regular supply of fresh, dry, and purified, or disinfected air, with means also for ejecting the vitiated air. Fig. 1, sheet 1, is a sectional elevation, showing the arrangement for ventilating a building, hall, or chamber. In this figure A represents a building; an air inlet is provided in any suitable position near the roof; this inlet opens into an 'air inlet box' B, shown also in detached transverse section at Fig. 2, sheet 1. This air inlet box has two divisions, the outer and larger division A containing coke saturated with any suitable

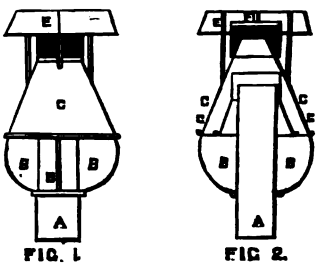


solution, and serving either to absorb moisture or to destroy infusoria. The other and smaller division *b* of the box may be filled with dry charcoal, limestone, or other suitable material, the box being provided with a tray C for collecting any solution which may drain from the coke, the bottom being perforated for this purpose. The sides of the box B are also partly perforated to allow of the free passage of the air. From any suitable position, such as at C near the floor of the building or chamber, passes a shaft or pipe D extending above the roof, where it is provided with a cowl E, preferably one constructed as hereinafter described and shown in section at Fig. 3, for producing an induced current up the shaft or pipe D; or in some cases the cowl may be dispensed with. An air inlet shaft F is also provided, the lower end of which passes into the building just under the lower open end D of the hereinbefore described ejecting shaft or pipe D, a nozzle G at the end of the said air inlet pipe F opening into the lower end of the ejecting shaft or pipe D, as shown, the upper end of the same being provided or not with a cowl.

307. (1881.) IMPROVEMENTS IN APPARATUS FOR PREVENTING THE FREEZING OF WATER IN PIPES: J. RULE, DUBLIN. [6d.]—The object of this invention is to prevent the freezing of water in pipes by not allowing the water to remain in the pipes, and for this purpose I apply an apparatus to existing ball or supply cocks (or it may be to ordinary taps), and at the highest convenient part of the pipe, so that by the opening of a tap at a lower level than the cistern or tank, and when the stop cock on the pipe from the water main has been shut, the water that is contained between the said tank or the apparatus in connection therewith and the said lower tap shall be run off by the opening of such tap, and this is effected automatically and simultaneously with the opening of the tap at the said lower level. Figs. 1 and 2 show in longitudinal vertical section a ball cock arrangement fitted with air valve of spherical shape. At Fig. 1 the ball valve lever is shown depressed with the supply valve open; at Fig. 2 the ball valve lever is shown raised, and the supply valve closed. Fig. 3 is a view in longitudinal vertical section of a similar arrangement wherein a vertical spindle valve is shown; in this figure the ball cock is shown raised, and the water is shown in the supply pipe; the water has been withdrawn by reason of the opening of a cock at a lower level, consequently the air valve *a* falls from its upper seating a^1 to its lower seating a^2, but on the admission of water to the service pipe C the air valve is immediately closed.



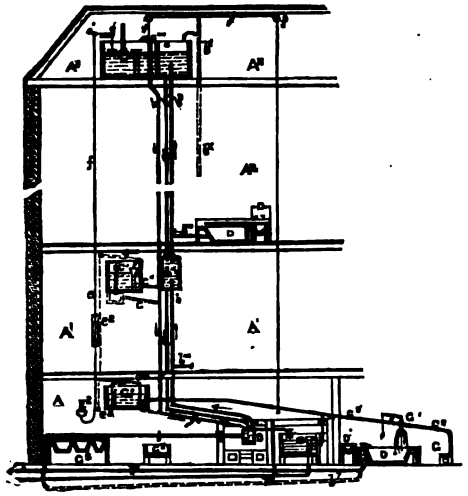
403. (1881.) IMPROVEMENTS IN VENTILATING POTS OR COWLS FOR SOIL PIPES: THOMAS BATE, KILBURN, MIDDLESEX. [4d.]—This invention has for its object to provide a ventilating pot or cowl for the tops of soil pipes, which shall effect the extraction of sewer gas from the soil pipes, and act under any direction or force of wind, thereby making a down draught impossible. Fig. 1 shows a side view, and Fig. 2 a vertical section of a ventilating pot or



cowl constructed in the manner preferred for carrying out this invention. A is a tube or pot, the lower end of which is to be secured in the usual manner to the upper end of a ventilating pipe carried up from a soil pipe; B, B, are wings of sheet metal standing out radially from this pipe; there may be 4, or 6, or other desired number of such radial wings; C is a coned cover supported by these radial wings, and having an outlet at the top; D is a cylinder of wire gauze soldered at its lower end to the upper part of the cone, and rising up above the outlet at the top of the cone; E is a cap of sheet metal at a short distance above the top of the gauze cylinder, it is carried by four or other number of metal rods F from the cone as shown. Within the interior of the cone C, and between it and the tube A is a smaller cone G, also carried by the radial wings B as shown. This inner cone adds to the efficiency of the ventilating pot or cowl but it might be constructed without this inner cowl.

440. (1881.) IMPROVEMENTS ON AND CONNECTED WITH APPARATUS FOR SUPPLYING, HEATING, AND CIRCULATING WATER FOR DOMESTIC AND OTHER PURPOSES: T. JACKSON, EDINBURGH. [6d.]—This invention has reference to improvements in the construction and arrangement of water heating boilers in connection with cooking ranges or other fireplaces, and with their supply and circulating apparatus, or cisterns and fittings connected therewith, for the supplying, heating, and circulating of water through and in houses or other premises for domestic

l other purposes, all in a more safe and efficient manner n heretofore, in various circumstances and conditions of ather. The claims are enumerated below. 1. The neral construction or combination of the parts of kitchen ges with a high pressure boiler B, and its water supply- and circulating fittings, with branch feed pipes c^1, c^3, l cocks or valves c^1, c, for supplying water from the terns in any flat above it, and circulating it through the ler from said cisterns, all as shown in and for the pur- es described in reference to the drawing. 2. The use a float E, recording index E^1, and alarm E^2, for indi- ing the level of the water in, and proper working of upper supply cistern C^1 of high pressure boilers for chen ranges, all as shown and described in reference to



e drawing. 3. The combination of a hot circulating tern C with the cold water supply cistern C^1, for pre- ating freezing of the water therein, fitted in connection th the high pressure boilers B of kitchen ranges, and th or without an expansion circulating pipe $b\times$, all as wn and described in reference to the drawing. 4. The mbination of an open or balance circulating hot supply tern C^3, and fittings in connection with the high pressure iler B of kitchen ranges, so as to work the boiler either the high pressure or on the low or balance principle, and ther with or without a cold water supply or storage tern C^4 directly attached or adjacent to the circulating tems C^3, all as shown and described. 5. The combina- n and use of the lower drawing-off or cleansing pipe b^8, b^9 m the pressure boiler B, or hot water circulating cistern tank C^3 of kitchen ranges, with branch fittings and taps r causing a return current to such boilers, or the filling baths or other vessels with hot water from the pipes and terns on the same level, or in the flat below the boiler, as shown and described in reference to the drawing. 6. e simple modes of temporarily filling the pressure boilers f kitchen ranges by cisterns or fixed or movable fillers, l their tubes and taps, to work either on the high pres- e or open principle, all as shown. 7. The combination kitchen ranges of a high-pressure boiler B and an open 'balance' boiler, so arranged that the fire or heat from fire can be made to act only on the one boiler or the er, or both, as required, all substantially as and for the rposes described. 8. The arrangement of a close or ssure water boiler, or spiral tube fitted with an open hot ter boiler, and having circulating and heating pipes connection with it, for heating green-houses or other ch buildings.

527. (1881.) IMPROVEMENTS IN WATER-CLOSETS: CLARK, NEW CROSS, KENT. [6d.]—This invention s for its object, 1st, the construction of the water-closet paratus in few parts and complete in itself, so as to re- e no fixing beyond the necessary connections with the soil-pipe and water-supply pipe; and, 2nd, the more effec- tual cleaning of the basin or pan. Here the ordinary wood frame or casing is dispensed with, and the casing is constructed of porcelain, with a sloping partition leading to a syphon at the lower part, enclosing and receiving the contents of the basin. This casing is of oval or circular form in plan, so as to stand complete in itself without sup- port against the walls of the apartment. The basin or pan is of the revolving or lift-up kind, that is to say, it is mounted on side trunnions, and is emptied by being tilted upon its axis. The basin is of oval form also, but it may be in the form of a segment of a sphere, but its periphery must be concentric with the axis of the trunnion. The front half of the circumference of the basin has inwardly and outwardly projecting flanges, which form the front half of

FIG. 1.

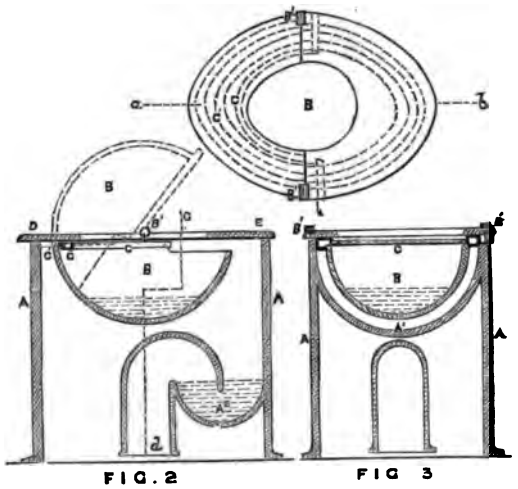
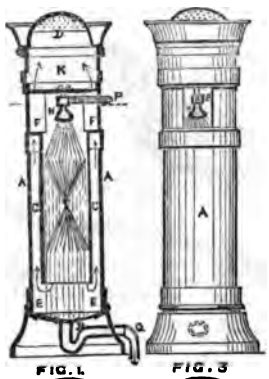


FIG. 2 FIG 3

the seat, and may be covered with wood or other bad con- ductor of heat for the sake of comfort. The outer flange rests upon the top edge of the casing, and a combined flushing pipe and scraper runs round inside the basin at the front part just beneath the inner flange. The rear half of the seat is formed by an inwardly-projecting flange on the casing, extending just over the edge of the rear half of the basin, which is rather lower than the front. The flushing-pipe is in the form of a semi-circle, so as to extend around the front half of the basin in the position above described, and is by preference a pipe of square section for convenience in attaching the scraper, which is preferably a strip of India-rubber, leather, or other suitable yielding material fixed on the top of the pipe, and projecting out- wards against the inner surface of the basin. The pipe is perforated with rows of holes on the outer side just beneath the scraper, and, by a suitable mechanical contrivance, the water is turned on by the act of revolving or tilting the basin. The scraper deflects the water downwards, and by the upward movement of the basin the contents are swept out and the basin is effectually cleaned and flushed.

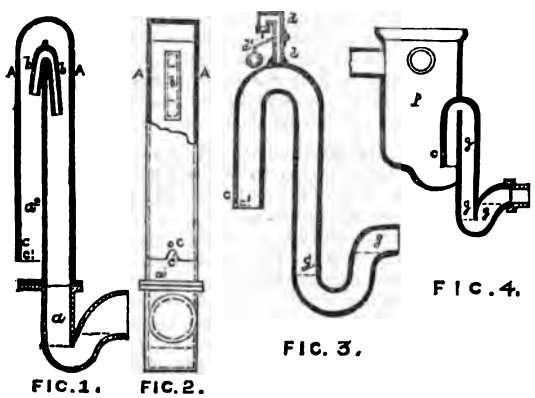
571. (1881.) IMPROVEMENTS IN APPARATUS FOR VENTILATING, COOLING, AND WARMING BUILDINGS AND ROOMS: H. MESTERN, BERLIN. [6d.]—Fig. 1 is a vertical section of the apparatus, Fig. 2 is a horizontal section, Fig. 3 is an elevation, and Fig. 4 a plan or hori- zontal view of the same. The cylinder C, open at the lower end, is fixed concentrically on and into the larger cylinder A, the bottom of which is hollowed out, as shown. The annular space E between the two cylinders A and C forms the air-passage which leads to the air distributor K on the top of the apparatus, through the perforated cover D of which the air passes into the room, or into a draft pipe leading off the bad gases of dwelling-rooms, or the vapours of a kitchen into the open air or into a chimney. The interior of the cylinder C forms the spray chamber communicating at the lower end with the air-passage E,

and at the upper end with the air-openings F, under the bottom of the distributor K, to the underside of which is fixed the spray nozzle H, which may be of either common or peculiar construction, receiving water under pressure from the supply-pipe P, and discharging it in the form of a diverging cone against the inside walls of the cylinder C. By the force of the water it is deflected from the walls of the cylinder C against the opposite walls, whence it drops down to the bottom B of the cylinder A, a portion of the water falling down directly to the bottom B, and being carried off by the waste-pipe Q. The working of the apparatus is as follows :—The water ejected and spurting from the nozzle H with great force fills the cylinder or chamber C with a very finely-divided spray of water, which acts in a downward direction like a continuous plunger,



carrying along all the water contained in the cylinder or chamber C, and drawing in air, gases, or vapours through the openings F. When the mixture of air and water, in a state of spray, has reached the lower part of the cylinder or chamber A, the purified and cooled air becomes separated from the water, is pressed upwards, and escapes through the apertures in the top of the distributor K. When warmed air is required to be distributed, hot water is used instead of cold.

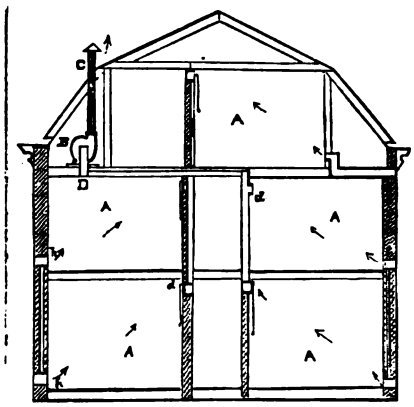
727. (1881.) APPARATUS FOR FLUSHING AND VENTILATING DRAINS: SAMUEL HENRY ADAMS, LEEDS. [6d.]—This invention consists of a syphon, by preference of a rectangular form, having an internal smaller syphon, which is for the purpose of discharging with a small flow



of liquid into the falling or outlet leg of the larger syphon. This action of the liquid through the smaller internal syphon has the effect of quickly withdrawing the air from the larger syphon, and consequently bringing it into a He provides a small hole in the inlet leg of the syphon above the point at which the liquid is drawn o that directly the liquid falls in the tank below the lev the hole it allows the ingress of air, which immedi puts the syphon out of action until the water rises aga the right level, when the discharge occurs again, and action is repeated. This construction of syphon is espe applicable for automatic flushing of sewers and h drains, for use whenever a speedy discharge and i mittent flow is required, also for purposes of intermi filtration. When preferred he dispenses with the int smaller syphon, and applies a tube at or near the crov top of the larger syphon, through which the air is hausted, for the purpose of bringing the syphon into a by withdrawing the air therefrom; or water may be p into the syphon through this tube for the purpose of b ing the syphon into operation. Fig. 4 is a transverse tion of tank and syphon used as flushing closet an other purposes.

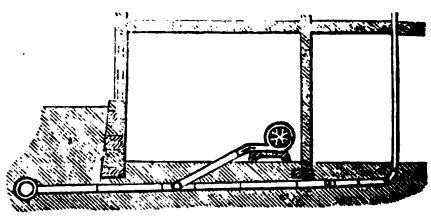
AMERICAN PATENTS.

242,264. VENTILATING BUILDINGS, ETC.: R. BU MORE, BUFFALO, NEW YORK. Filed March 22, 1 *Claim*—1. The combination with an enclosed space A fan B having its suction-pipe C connected with the encl space, an air inlet passage E, and an automatic va



arranged in the said passage, whereby the external excluded from the enclosed space, except when it i quired to replace the air which is withdrawn from the space by the suction-fan, substantially set forth. 2. combination, with the air inlet passage E, provided w partition *g* depending from its upper side of a va hung above its centre of gravity in the air inlet pas and coming in contact with the outer side of the par *g*, when the valve is closed, whereby the valve is prev from opening outward, substantially as set forth.

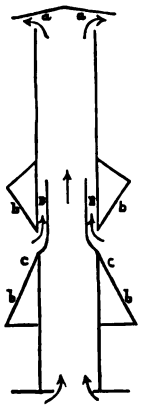
242,169. METHOD OF VENTILATING SEWERS DRAINS: T. S. VERT, BOSTON, MASS. Filed M 1880. *Claim*—1. The improvement in the art of ver ing sewers herein described, which consists in forc



current of air outward from a building into the mai branch drains connected with such building, wherel flow of sewer-gas into the building is prevented, su tially as specified. 2. The combination of blowing

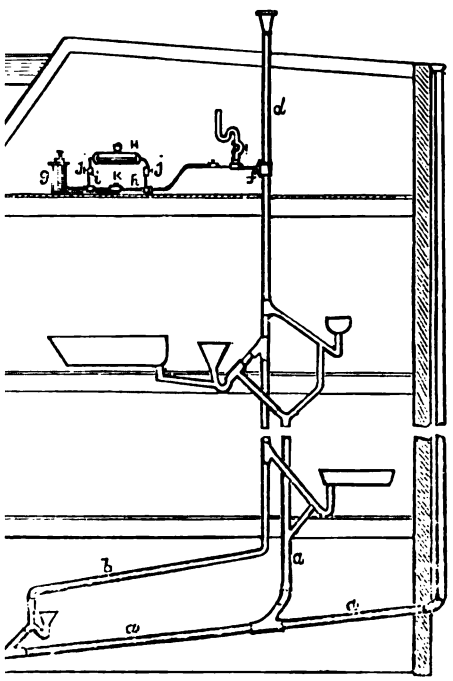
pparatus with the drains of a building in the man-or the purpose set forth.

0. VENTILATOR: W. T. COTTIER, NAPA. ne 10, 1881. *Claim*—1. A ventilating apparatus of a tube or chimney A, provided with the with their inclined sides, and directing plates or *b*, entirely surrounding the chimney, as shown, ings C, and the induction tubes B, whereby the rected into said induction tubes, and an upward



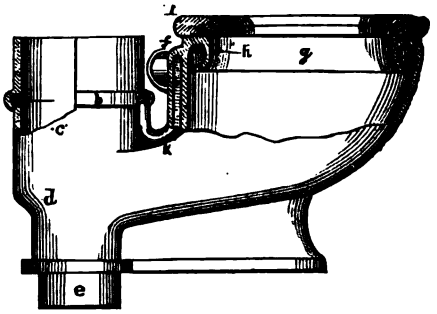
maintained, whatever may be the duction of the bstantially as described. 2. In a vertical flue or having openings upon the four sides, and directing ading upward from these openings within the the exterior air concentrators or concaves com-ng with each of the openings, and having their angles united, so that currents of air from any will be led into one or more of the openings, sub-as and for the purposes herein described.

1. TESTING DRAIN-PIPES: F. TUDOR, NEW Filed Dec. 24, 1880. *Claim*—1. The combina-



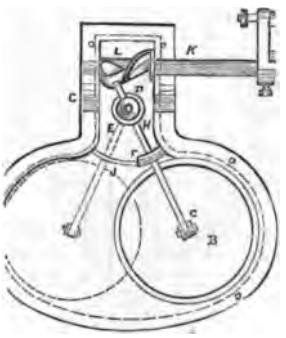
a system of drains, substantially as set forth, of a r air pipe, having an opening or nipple *f*, a pump *g*, ascent chamber H, air pipe *h*, branch pipes *ii*, provided with cocks *jj*, and communicating with the opposite ends of the scent chambers, and the cock *k*, between said branch pipes, whereby either common or scented air may be forced into the drains at will for testing said drains, substantially as shown and described.

243,719. WATER-CLOSET: A. G. MEYERS, NEW YORK. Filed April 18, 1881. *Claim*—1. In a water-closet, a flushing rim provided with projections on its interior, substantially as and for the purposes herein set forth. 2. A water-closet of substantially the kind described, having an upright limb or valve-chamber adjoining the basin, with a water channel formed in or on its walls, encircling or partly encircling the same, and discharging interiorly through the said walls to emit a



scouring washdown and around the sides of the said chamber, and upon its enclosed plunger, when the closet is operated, substantially as herein set forth. 3. A water-closet, of substantially the kind described, formed with a basin *a*, and upright limb or valve-chamber *c* adjoining the same, and provided with a water-nozzle *f*, connecting to the said basin, and a water-duct and channel, *k i*, leading therefrom, and extending about and discharging interiorly therein and around the sides of the said limb, the said parts being formed in one continuous structure of earthenware, substantially as and for the purposes herein set forth. 4. The combination of a water-closet basin having a rim formed to directly support the seat, and provided with attaching plugs *n*, let into the rim with the seat *l*, supported on the said rim, and screws *m*, extending through the same into the said plugs, substantially as herein shown and described.

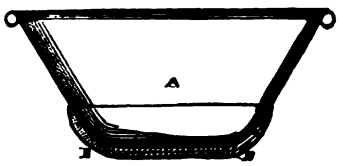
241,568. SEAL-TRAP FOR WATER-CLOSETS, SEWERS, ETC. O. W. SPRATT. PHILADEPHIA, PA. Filed Dec. 21, 1880. *Claim*—1. A seal for water-closets, etc., having a flanged valve and guttered seat, a longitudinally extending lever connected to the valve, and a transversely ex-



tending shaft provided with a lifting and shifting device, substantially as described, whereby, by a single motion of the shaft, the flange of the valve is raised clear of the guttered seat, and the valve is moved laterally, and on the opposite single motion of the shaft, the valve is returned and dipped into the guttered seat for the purpose set forth. 2. The valve B, in combination with the lever C, ball and

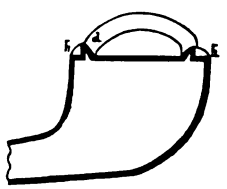
socket-joint E H, spiral collar L, and rotary shaft K, substantially as and for the purposes set forth.

243,329. WATER-CLOSET PAN. R. H. TRESTED, NEW YORK. Filed April 11, 1881. *Claim*—A water-closet pan composed of sheet-metal, with a celluloid or collodion lining, which has been pressed upon or applied,



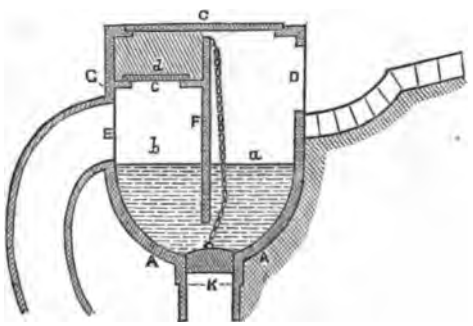
while in a liquid state, to the bottom portion or the whole of the inside of the pan, thereby forming a smooth coating without joints, and held thereon without fastening devices, as and for the purposes set forth.

243,447. GLASS WATER-CLOSET BOWL. G. E. HATCH, MERIDEN, CONN. Filed March 21, 1881. *Claim*—1. The method herein described of making water-closet bowls from glass, consisting in blowing the glass in a mould constructed with a cavity around the top corresponding to the



flange around the opening, but broader than the flange, so that the glass will enter the said cavity, and form a corresponding cavity upon the reverse or inside of the top, then cutting away the upper edge of the flange projection into the cavity upon the inside, so as to separate the central part and form the upper opening, substantially as described. 2. As a new article of manufacture, the herein described water-closet bowl, as made from glass blown in a mould, substantially as described.

242,236. SEWER-TRAP: P. TORELLI, BENICIA, CAL. Filed March 26, 1881. *Brief*—A sewer-basin having inlet and outlet openings, and divided into two compartments, one of which is further divided by a horizontal partition having an opening with a removable cover, the said compartments being connected together below. The trap



is further provided at the bottom with a removable plug. *Claim*—1. A sewer-trap consisting of the casing or shell A, provided with inlet and exit openings D and E, and divided into two compartments *a* and *b*, by the vertical longitudinal diaphragm F, the said compartments being connected with each other below, and the latter compartment being provided with a horizontal diaphragm G, having an opening *c*, *fitted with a removable lid d*, the whole device being provided with a removable lid C, substantially as a purpose herein described. 2. A sewer-trap, co the casing A, having inlet and exit openings, a in to two compartments opening into each other of which is provided with a secondary cover, and the bottom aperture K, fitted with a remov and connected to sewer, substantially as and fo pose herein described.

SANITARY JOTTINGS.

Dr. Domenichetti communicates a very low for Louth Urban and Rural Sanitary Districts fo ber—viz., 5.5 for Louth Urban and 8.8 for Lou We are not aware of anything approaching it ha recorded before in our columns.

The Paris Société de Hygiène has, with the indefatigable director, Dr. Pietra Santa, com published a little guide to vaccination of a ver nature: '*Guide du Vaccinateur, les Deux Vacci d'Enfant, Vaccin de Genisse.* Paris, 1881.' The vaccinating and the result of vaccination are described. Three small incisions, from two millimètres in length, are recommended as a vaccinating often preferable to the classic metho ture. Vaccination from the calf is also described it the means of cultivating calf lymph, as w preserving it.

J. Munk, in *Chem. Zeitung*, IV, 20, states doses of alcohol decrease the decomposition of minoids in the organism, but large stupefying have the opposite effect.

At the approaching Exhibition at South Ken Smoke Abatement Appliances, Messrs. Doulton of Lambeth, will exhibit a handsome and i assortment of their Ceramic Radiating Stoves, e some new features, full particulars of which will in our report of the Exhibition in the next num SANITARY RECORD.

URBAN AND RURAL SANITARY WORKS.—T field Town Council have appointed a committee to consider the advisability of purchasing the w supplying the town.—A commodious and com ranged new dispensary has been opened in Uni Hereford. The cost of the building, exclusive o been £1,000.—A new cemetery, situated on the Road, Stratford-on-Avon, comprising an area of has been opened, the cost of which is about £1,3 new sewerage works of Canterbury are, after m perfected and in full working order. The total been £8,300. The sewage farm covers twenty- and a half of land.—The Galashiels Town Cou accepted the offer of Mr. Scott, of Gala, of th ground as a public park, the Corporation havi taken to keep it in order.—New sick wards are be to the workhouse at Newport, Isle of Wight.—T Council of Ashton-under-Lyme have agreed to offer of Stamford Park, estimated to be worth £ be kept up at the joint cost of the Local Auth Ashton, Stalybridge, and Hurst as a public pa Town Council of Leamington are about to make ments and additions to the waterworks.—The se Kenilworth is rapidly progressing towards com The Local Board of Richmond, Surrey, have ad recommendation of their water engineer that th well should be deepened from 400 to 1,200 ft. by bore.—The Local Authority of Kirkintilloch hav on plans for the formation of a water reservoir a mated cost of £6,000.—The Mexborough Local about to carry out works for the disposal of sew Burnley Corporation have resolved to go to P with a view of obtaining increased powers to com reservoirs and other sanitary improvements.

GINAL PAPERS.

ARY CONDITION AND LAWS DIÆVAL AND MODERN LONDON.*

W. TRIPE, M.D., M.R.C.P.ED.,
the Society of Medical Officers of Health.

dress from this Chair becomes every :ult, both as regards the selection of the matter itself, in consequence of r in which my predecessors have pre- ews before you. After much consi- ided on selecting for my subject the tion and Laws of Mediæval and Mo- Of course it is impossible in the ccupied by these addresses to do efly sketch the salient points of my d, I am in some doubt if many of y not consider it beyond the bounds tion; but I hold the opinion that the ly be fairly judged by looking at the ture can be predicated only by a con- th.

arefully at the legislative measures orce in Mediæval London, including, only Acts of Parliament, but also ances, we should almost wonder at of plague, sweating sickness, and es, which more than decimated the n time to time, as well as the large frequently devastated portions of the s and ordinances in existence at this have prevented both, but they were cted, and, at the most, only spasmo- l, in the same way as our leet juries their work, for they had the power d it, of condemning uninhabitable noving many of the nuisances which ted the comfort, if not the death-rate n of England. The chief reason for pears to be that the Acts and ordi- ich in advance of the habits and ideas ion, and, therefore, fell into disuse tely after the passing of the act.

f the early Norman kings most of the don were built in a very primitive wood, or mud and clay mixed with red with a thatch of straw or rushes, a fire broke out it often became of agnitude, and, as water had to be he nearest streams, it was often ne- down adjoining houses with large ent the spreading of the fire. An hich occurred in London in the reign n led to an ordinance being issued in the reign of Richard I (1189), known e's Assize of Buildings. This con- portant regulations, not only as re- ture of buildings but their appur- s it was ordered that the party walls hould be made of stone three feet in if the expense were borne equally by vas to be taken equally from both; bour of the one wishing to build were cted, the latter was to give three feet other to build on, when the wall, e raised 16 feet high, became their joint property. If they agreed to make a joint gutter to carry off the rain-water, they might do so; but, if not, each had to provide his own gutter to carry the water on to his own land or the highway. There was also a curious provision that, if a man built a stone wall on his own land and carried the eaves over his neighbour's, the latter was required to make a gutter for carrying off the water either on to his land or the highway. Another regulation, which must often have interfered not only with the light, but the ventilation of houses, was that a person might build against the windows of his neighbour, unless there was an agreement in writing to prevent him from doing so. If, however, the new building was considered to be unjust, there was power of appeal. The 'Assize' also stated that, in consequence of the fire previously mentioned, which destroyed houses from London Bridge to the church of St. Clement Danes, many of the citizens built stone houses and covered the roofs with thick tiles. It will be noticed that the regulation height of the stone wall was 16 feet, to admit of two stories, one of the upper being called the 'solar', which was the chief room in the house, and was entered by means of a ladder or staircase, the latter being usually placed outside. Above the solar was erected a pent-house, overhanging the footway, the eaves of which were to be sufficiently high to allow a man on horseback to ride under them. The goods sold at the stall or shop were suspended under the eaves or placed on a board, whilst the stall, placed outside the house, was not allowed to be more than two feet and a half wide. At this time, comparatively few of the smaller houses had either glazed windows or chimneys, and were, therefore, cold, dark, and dirty; but, early in the fourteenth century, these were commonly found in all houses. In better class houses both were ordinarily met with in the reign of Richard I.

In the articles of the Wardmote made in the reign of Edward II, it was expressly provided that no chimneys be henceforth made, except of stone, tiles, or plaster, under pain of being pulled down, and that all houses within the franchise should be covered with tiles, etc. It was also provided that all who dwelt in great houses should have a ladder or two in case of fire, so that low houses were by no means universal at that time. That houses were subsequently built of wood, or wood and daubing, is very evident from the frequency with which fires occurred, and the distance to which they spread.

A very graphic description of London in 1350 is given by a contemporary anonymous writer. He states that, although there are numerous large vacant spaces within the walls, belonging to the mansions of the nobility, the halls of City companies, as well as to the monasteries and convents, yet the populated parts were intersected by narrow streets, lanes and alleys, encumbered with houses, whose apartments, jutting out storey above storey, almost touched one another at the top, so as to make the streets dark and unwholesome. The houses were much overcrowded, and several statutes were passed to prevent, not only overcrowding, but the building of new houses. Indeed, this was carried to so great an extent by Queen Elizabeth, that it was ordained in 1580 that every newly-built house should have four acres of land, and numerous houses were pulled down, and the builders and workmen were punished by fine, or imprisonment without bail, for disobeying this law. It was also ordered that two newly-built houses should be thrown into one to reduce the number; and, at the time of the plague, the 'Har-

dress, delivered before the Society of Medical October 1881.

binger' had power to put infected persons into these houses. This proclamation was issued 'because there are such great multitudes of people brought to inhabit small rooms, whereof the greater part are seen very poor, yea, such as must live of begging, or by worse means, and they heaped up together, and, in a sort, smothered with many families of children and servants in one house or small tenement'.

How these evils were to be cured by restricting the number of houses I fail to see; indeed, it seems to me, that so far from being a means of preventing, the proclamation must have led to more overcrowding. At a later date, Sir W. Davenant referred, in a letter, to the contiguity of the top storeys of houses, which were, he says, so close together, that the inhabitants of houses on opposite sides of the streets could shake hands. This style of building is even now to be seen in Mercerie Lane, Canterbury, but the storeys do not overhang so much as is stated by these writers.

The interior of the smaller houses is described, up to the time even of Chaucer, in anything but flattering terms, as we learn from his *Canterbury Tales*. Very many were dark, badly ventilated and filthily dirty, not only from the want of chimneys but from the habits of the people. In the better class houses, although there were glazed windows and chimneys, yet the floors are described as being filthy in the extreme. Even as late as the reign of Henry VIII, we learn from a letter written by Erasmus to Dr. Francis, 'that the floors are commonly of clay, strewed with rushes, under which lies unmolested an ancient collection of beer, grease, fragments, bones, spittle, excrements of dogs and cats, and everything that is nasty'. Of course this description refers to the ordinary living room which was situated on the ground floor, the solar and other upper rooms, if any, having boarded floors. Dogs, 'genteel dogs excepted', were not allowed to go at large under a penalty of 3s. 4d. to the use of the chamber, but were kept at home, and pigs also, except those belonging to the Hospital of St. Anthony, were to be retained on the premises or in the house. If found running about the streets, the persons seizing them were directed to kill and keep them for their own use, or to give them back at the price of fourpence for each pig. In spite of this edict, pigs were kept in pigsties in the streets, and to remedy this four men were elected and sworn in to see 'to the removal of the sties, and killing of all pigs, except those of St. Anthony's Priory, that might be found at large in the streets, fosses, or suburbs of London'. To prevent pigs not belonging to St. Anthony's Priory being claimed by the renter, he was sworn not to put a bell on, or to claim any which were not given to the Priory in pure alms. The references to swine in the *Liber Albus* are very numerous.

As it is generally supposed that most of the excrement was cast into the streets for the rakers to remove, I will refer to a passage about 'necessary chambers', from Fitz-Elwynne's Assize. Concerning these, it is ordained that, if the pit of such chamber be lined with stone, the mouth shall be 2½ ft. from the land of the neighbour, but if not so lined, it must be 3½ ft. away. These pits were emptied by nightmen, and taken to lay stalls at Mile End, Dowgate, or Puddle Dock, or to Whitefriars. At a later date, the lay stalls at Mile End are described as being intolerable nuisances, and were not removed until quite recently, as, when a boy, I received a practical evidence of their existence.

The streets both within and without the walls were narrow, and became more injurious when houses were built higher, and especially when w were known as 'middle rows' (like that lately moved in Holborn) were built in the roadway several streets. Where permanent buildings v not erected, shops, and even smithies, were quently placed there. Aldgate Street, Corn Cheapside, Newgate Street, Ludgate Street, many others had middle rows. These were in istence at the time of the great fire of London, must have materially assisted in rendering the unhealthy.

Although sewers are mentioned by Fitz Step as being in use at the time he wrote, which wa the reign of Richard I, yet he most probably m merely the channels in the centre of the str which communicated with other channels leadin the Thames. These latter are especially dire in several ordinances to be kept clean. The str were paved with small stones without any ra footpaths, and sloped down to a channel in centre, which carried off the rain-water and mos the slops. Fishmongers were especially ordered to cast their slops into these channels. There also another regulation that nothing was to thrown out of the windows between sunrise and n at night, under a penalty of 3s. 4d.; and that a one who sustained damage by such an act was to re-couped by the person emptying the slops. was especially mentioned that 'urine boles a ordure boles' were to be brought down and cast in the channel. It is evident from these regulation that the streets must have been in a filthy condition even when the pavement was in good condition; but, as each person had to pave the street in front of his house, and keep the channel clean and in order, the pavement must have been often in a very bad state. That this was so, especially outside the boundaries of the City, is shown by the frequency with which ordinances were issued, or Acts of Parliament passed, for paving these thoroughfares. Thus, in the time of Henry VIII, the roadway between Temple Bar and Westminster was directed to be paved at the expense of the owners and occupiers of houses abutting on the street, and kept in order from tolls to be paid by those riding on or driving along it. This is the first notice of a toll on horses and carriages, and it is said to have answered very well. As the streets were narrow, and there was not any raised path for foot passengers, posts were placed at a short distance from the walls of the houses to protect persons using the paths from the horses and carriages, and were said to be a great annoyance. As the pent-houses overhung the pavement the passengers kept as close to the walls as possible. This often led to quarrels and loss of life, so that, what with pools of dirty water under foot, and deluges of rain above, the condition of a wayfarer after passing through the City on a rainy day must have been anything but conducive to good health, especially as umbrellas were not then used.

Although the citizens were required to keep the pavement and channels clean, they were not called upon to remove any of the filth swept up, but a class of men termed rakers were appointed and paid under the articles of the Wardmote for each City Ward, who were ordered to place it in carts, and take it to the places ordained for its reception. These were at Mile End, and the other places previously mentioned. Frequent ordinances were also made forbidding filth to be thrown into the river Thames or any of its tributaries, the chief of which

Fleet. There were also special articles of ardmote, prohibiting anyone from throwing other filth into the streets, and especially utchers appear to have been rather frequent s on this point. In the fourth book of the *lbus*, as well as in other books, there are ited many special regulations for the removal the cleansing of the hythes and fosses, lanes eets; for the custody of the conduits and urses; and for the cleansing of the Fleet ditch. ere also divers other ordinances as to pent- rain-gutters, stalls, jetties, cellars, and pave-

It was the special duty of the scavagers to end the streets, as the oath taken by them, appointment, sufficiently shows. As the somewhat curious, I quote it at length:— all swear that you shall diligently oversee pavements within your Ward are well and epaired, and not made too high in nuisance eighbours; and that the ways, streets, and e cleansed of dung and all manner of filth decency of the City, and that all chimneys, , and reredoses are of stone, and sufficiently d against peril of fire; and if you find any- the contrary, you shall show it to the alder- at so the alderman may ordain for the ent thereof. And this you shall not fail to God your help and the Saints.' It will be m this that the scavager was a surveyor and ctor of nuisances, whilst the rakers actually l the filth. The provision for the removal of lth was not great, viz.: twelve carts with two ach for the whole of the city.

egulations respecting the prevention of foul- water courses and the Thames, especially by s, appear to have been rarely enforced, as, Edward the Third sent a letter to the mayor riffs, commanding, that all bulls, oxen, hogs, er gross creatures, to be slain for the sus- n of the said city, should not be killed at a ance than Stratford-le-Bow on the one side, ightsbridge on the other, so that the air of might no longer be rendered corrupt and s by means of the putrid blood and entrails e butchers had been accustomed to throw streets, or cast into the Thames.' The was forfeiture of the carcase and imprison- In the twelfth year of the reign of Richard nd, butchers were allowed to erect slaughter- n the banks of the Thames, and carry away in boats, and throw it into the Thames; but repealed in the sixteenth year of the same hen butchers and others were prohibited owing offal, etc., into the Thames, under a of £40. A similar law was enacted in the Henry VII, showing that the convenience g beasts in the city had prevailed over the

rst Commissioners of Sewers were appointed te in the sixth year of Henry VI, which Act ost a dead letter; but, in 1531, a commission ointed to survey the walls, streams, ditches, utters, sewers, gotes, calcies, bridges, etc.; a subsequent statute, in the third James I, rs of the Commissioners for London were l to all places situated within two miles of

The word 'sewers' is used as well as so that, in 1531, there must have been some in London, but what they were I have not e to ascertain, as there is no mention what- ewers in the *Liber Albus*, or in any book ove date to which I have had access. Pauli, however, when speaking of London in the time of Edward III, says, 'that special care was taken by the civic authorities to secure good draining for the running off of rain-water, as well as for the arrange- ment of sewers.'

The water-supply of London was obtained at first from the River of the Wells, *i. e.*, the Fleet, from the Wallbrook, Langbourne, the Thames, and from nu- merous wells dug in the gardens adjoining the houses, as well as from many public wells. In the reign of Henry III, twenty-first year, liberty was granted to Gilbert Sanford to convey water from Tybourne by pipes of lead, six inches in diameter, into the city. This pipe supplied the Cheapside Conduit, near Bow Church. Other conduits were quickly built, including one in Cornhill, called the 'Tonne'. One of the most celebrated was in Fleet Street, known as the St. Christopher. In 1285, the so- called great waterworks were opened at Westcheap, when large quantities of red and white wine flowed from the pipes. A very fine conduit was erected in 1655, in Leadenhall Street.

The earliest attempt to supply London with water by mechanical means was made by Peter Morris, who carried pipes into the houses on the Thames side of Gracechurch Street. The pressure was suffi- ciently strong to throw water over St. Magnus' Church, and was obtained from the Thames in 1582. The City granted him two arches of London Bridge, and the right to take water from the Thames for 500 years. In 1594, other works of a similar kind were erected near Broken Wharf, for the supply of houses in Westcheap, and around St. Paul's, up to Fleet Street. The supplies being insufficient, the New River Works were commenced in 1608, and opened in 1613, with results which I need not men- tion.

The laws against vendors of food, who sold tainted meat, poultry, fish, etc., were very severe. Thus, in the *Liber Albus*, we read of persons being put into the pillory for selling putrid meat, stinking capons, rabbits, pigeons, partridges, fish, eels, conger, pigs, and stinking boiled meat. A similar punishment was also inflicted on those who sold 'false shoes', and putrid wine.

The fire of London is usually said to have led to such an alteration in the overcrowded and narrow thoroughfares as prevented subsequent outbreaks of the plague. For reasons presently to be stated, I am of opinion that this was not the case.

It is true that the sanitary condition of the new part of the city was much better than the old, as the filth in the houses and streets was destroyed by the heat, but the rebuilding was in the old lines; and although most of the new streets were widened, yet nearly 4,000 additional houses were said to have been erected, partly on the gardens of the large merchants, and partly on those belonging to the City Halls and other buildings. A careful comparison of maps indu- ces a strong belief that this statement is incorrect. The chief improvement consisted in the better class, and greater uniformity of the buildings, the removal of the middle rows, which interfered so much with traffic and ventilation, and the building of most of the houses without overhanging floors. The pavements were also improved, but were made with small stones, as before. The streets were rendered of a more uniform level, by filling up the lower, and reducing the higher portions. Thus, Ludgate-hill was reduced from 10 to 20 inches at the upper part, and raised from 6 to 8 feet 7 inches at the lower. Thames Street and the adjoining streets and lanes were also

improved in a similar manner. I lay before you two maps, one of London in 1560, and the other in 1720, showing that the old streets, many under new names, were rebuilt on the old sites.

This very brief sketch of mediæval London would be incomplete without some reference to the prevailing diseases of the period, and especially to the plague, as well as to the population of the City. It appears from the bills of mortality that most probably the deaths in the city exceeded the births. Graunt, in his essay on the subject, states that the excess of deaths was very considerable, and was made up by immigrants, about 6,000 of whom he believes came to London every year. He and other writers thought, that with the exception of the period 1640—1660, when baptism was neglected, or the entries not made, the baptisms may be taken as a near approximation to the births; but when we consider that Mr. Rickman estimated that about 24 per cent. of the children born in 1821-30 were either baptised at home, or not baptised at all, it is not likely that the registers were more to be relied upon in 1603-67, than in 1821-30. It appears from the bills of mortality, that, during the hundred years 1601—1700, there were 1,572,635 deaths registered, of which as many as 188,571 were due to the plague: that there were only 984,499 christenings entered; but a comparison of the years before and after the twenty years 1640—1660 shows that at least 50,000 must be added to the total number, to bring it up to the average. This would make 1,034,499 christenings, which, with 25 per cent. added, makes up a total of 1,293,124, or an excess of deaths over births, amounting to 279,511. There is no doubt but that, especially in the plague years, a large number of deaths were not registered; indeed, De Foe estimates the mortality from the plague in 1665 at nearly 100,000, whilst the registers show only 68,596, and other authorities support him in his opinion. At any rate, I think we may take it for a fact, that the deaths in London exceeded the births during this century. The mean annual number of deaths for each ten years in this century (1601—1700), within the bills of mortality, was 11,169 in 1601-10; 8,167 in 1610-20, when but few died from the plague; 13,746 in 1621-30; 11,942 in 1631-40; 10,818 in 1641-50; 12,900 in 1651-60; and as many as 25,280 in 1661-70. During the remaining three decenniads, the numbers were respectively 19,117; 22,363; and 20,770. These latter numbers, as well as the baptisms, point to a large increase having taken place in the population of the City during these thirty years. It is somewhat singular that the number of males entered on the registers as having been buried was largely in excess of the females, for, between 1628 and 1661, there were 209,436 males entered, and only 190,474 females. The same occurred, but to a smaller extent, with the baptisms, as there were 139,782 males, against 130,866 females. This may have been caused by the greater importance, socially considered, of male than female baptisms and deaths.

The plague caused a very large number of deaths in the 12th, 13th, 14th, 15th, and 16th centuries, as well as in the 17th. It is reported that about 100,000 died in London in 1352; 30,000 in 1401 and in 1499; and nearly as many in 1582 and 1587. In 1603, as many as 36,000 were entered on the registers; in 1625 they were nearly as numerous; in 1636, 10,000; in 1646, 10,415; in 1647, 10,462; in 1649, 10,499; and in 1651, 10,804 deaths were recorded. From that time, until it broke out in 1665, there was a comparative cessation of its attacks. Its final disappearance is commonly attributed to the fire of London; but that is clearly an error, as the disease broke out, on the two last occasions, in the same street in Whitechapel, and thence spread, affecting chiefly the poor, to the city itself. Now, after 1665, although Whitechapel, and the localities in the neighbourhood of the Thames, east of where the fire occurred, remained unchanged, the plague did not appear amongst the inhabitants of these places, nor amongst those of St. Martin's and St. Giles's, who are described as being 'very filthy in their habits'. It is quite clear, that as only thirty deaths were registered from plague after 1665, that some cause must be looked for, other than the fire, to account for its cessation. During the seventy years, 1601-70, there were registered 761,603 deaths from all causes, and 188,571 from plague, so that 21 per cent. of the deaths from all causes occurred from plague. As the returns were made by the parish clerks, and as large numbers of the dead were buried in unconsecrated ground, there should be about 20 per cent. added on to the numbers just given. Mr. Rickman stated his belief, that in 1821-30, about one-sixth of the total burials were not returned by the parish clerks. As also an examination of the bills of mortality shows, that instead of a smaller number of deaths being recorded from "causes other than plague", there were almost always more when the plague prevailed; it is probable that during those years, not less than 25 per cent, of the total deaths was caused by plague. In the twenty years, 1611-20, and 1631-40, which included one period during which the plague was rife, and the other when it caused only a few deaths, the percentages of deaths from various causes, plague excepted, were as follows: from old age, 8.6 per cent.; from ague and fever, 12.9 per cent.; or with purples and spotted fever added, 13.9 per cent.; chrisoms (by which is meant deaths immediately after christening), and infants, 17.4 per cent.; from consumption and cough, 24.1 per cent.; from bloody flux, 4.2 per cent; from dropsy, 5.2 per cent.; from small-pox, 5.7 per cent.; and from teething and worms, 7.7 per cent. There was not any death mentioned from scarlet fever. It is commonly supposed that this omission arose from the deaths from this disease being entered under the names of measles or sore throat; but as the former is credited only with a mortality of 0.4 per cent., and the latter of 0.3 per cent., this can scarcely be the case.

I have not been able to meet with any description of scarlet fever in England at this date, whilst the malignant sore throat which devasted the shores of the Mediterranean about this time, and reached England about the time of the fire of London, corresponds pretty accurately with it. At a later period, viz., 1728-57, the deaths from fevers, including malignant, scarlet, spotted, and purples, were 14.8 per cent. of the deaths from all causes; small-pox 8 per cent., convulsions 27.7 per cent., consumption 17.0, cough and whooping-cough 0.5, asthma and tissick 2.1, making 19.6 deaths per cent. from chest affections. The deaths from old age were returned at 7.8 per cent. The ages at death at this last-named period were as follow:—36.3 per cent. of all the deaths occurred under 2 years, and 8.7 between 2 and 5 years, making 45 per cent. under 5; 3.4 between 5 and 10; 3.1 between 10 and 20; 7.7 between 20 and 30; 9.6 between 30 and 40; 9.7 between 40 and 50; 8.0 between 50 and 60; 6.3 between 60 and 70; 4.5 between 70 and 80; 2.3 between 80 and 90; and 0.4 above 90 years of age. These may be summarised

per cent. under 5 years of age; 6.5 per cent. n 5 and 20 years; 35 per cent. between 20 and d only 13.5 per cent. above 60. These figures e considered very unsatisfactory, as the mor- t 5 years is extremely high, and also between 60, whilst above 60 it is very small, in conse- of the excessive number of deaths below 60 f age. Before the fire of London the ages at ere, doubtless, looking at them from a modern- f view, still more unsatisfactory.

v approach the most doubtful part of my sub- ., the population and death-rates of mediæval n. The bills of mortality originally embraced parishes within the city walls, and the 16 s without the walls, which were within the s of the city. The out parishes were originally vere increased in 1626 by the addition of the Westminster, and 1636 by the further addition gton, Lambeth, Stepney, Newington, Hackney, otherhithe. The calculated population within ls was variously estimated, as Graunt in 1665 d there were 460,000 inhabitants, Sir W. Petty ed it at about 650,000, and others a much number. Graunt's calculation was based on ct only, viz., that 3 persons died out of 11 s per annum in some of the city parishes. He veraged the space built over as having 54 s in 100 yards square, and thus concluded that vere 48,000 families, each consisting on an e of 8 persons, including apprentices and s. It is obvious that such a calculation as uld not afford a reliable total. Besides which, gton states, as the result of a census of a city near the end of the 17th century, that there nly 6 persons in each house, which is below the average for all London. The inscription on the nent states that 13,200 dwelling-houses placed acres were destroyed by fire. There were 78 of the city left untouched, which would give 2,275 more houses, making a total of 15,475 . It is also stated (see Brayley) that nearly nore houses were built in the spaces left vacant fire, which would increase the total to 19,475 within the walls. Now the census of 1801 l that there were then only 8,738 houses within lls, and a population of 63,832 persons. It is ed by all writers of the 18th century that the tion of London within the walls decreased dur- t century, so that we may fairly assume that in was rather considerably, say 20,000, above that r. Sir W. Petty stated that there were 11,053 within the walls in 1665, but even this must een in excess of the true number. At 6 to a this would give a population of 77,000 persons, raunt says there were 12,000 families in the . 1635, which at 5½ to a family would give

There was, however, a census made in 1631 population residing in the City Wards, by which mber was returned at 130,178. This included pulation in the Wards of Bridge Without, Crip- e Without, and Farringdon Without, which num- 45,951 persons. In addition, there were those g in Bishopsgate Without, the part of Alders- nd also of Portsoken without the walls, giving mated total of 54,396 persons to be deducted he 130,178, leaving 75,782 persons as residing the city walls. The mean annual number of registered during the 63 years 1604-66, in- of the plague, was 3181, which, with 20 per added on for deaths not registered by the clerks, give an annual total of 3,727 deaths. divided by the population afford an annual death-rate of 49.2 per 1000 population amongst the residents within the walls of the city. I am aware that to a certain extent the results are unsatisfactory. but, after very considerable search amongst old writers and the Bills of Mortality, they are the best I can give.

I now propose making a great leap and commencing my account of the sanitary condition of Modern London at the year 1834, when a Committee of the House of Commons inquired into the administration of the sewers rate of the metropolis. It appeared from their report that other sewer authorities had recently sprung into existence in London, and obtained powers from Parliament to drain the districts which were not included in the 23rd Henry VIII, cap. 5. In carrying out their schemes, the newly appointed commissioners did not provide separate outlets to the Thames, but in most cases connected their system of sewers with those constructed in the city for carrying off the local drainage. The Committee reported that there was a want of system or combination between different trusts which had led to much inconvenience, for where the line of communication with the Thames was not complete, the improvements in one district had proved injurious to another. Thus, the enlarged sewers in the Holborn and Finsbury division having been connected with the City sewers, the latter became inadequate to carry off their contents, and led to the inundation of numerous houses in the vicinity of the river, by forcing back the sewage of these houses, and even caused a silting up of many of the small city sewers. The city engineer also complained that a sewer taking water from the Tower Hamlets was connected with the Irongate City sewer, compelling the City Commissioners to rebuild it at a great expense. At this time Cheapside and Leadenhall Street were not sewered, as they formed the highest ground, and had cesspools for excrementitious matters. As these cesspools were dug through the clay or loam down to the gravel, the whole of the fluids percolated into the earth as it was said 'for the benefit of the water drinkers'. One witness also stated that whilst all the inhabitants paid sewer rates, persons were not allowed to make a connection with a sewer except on payment of 17s. 6d.; that no one was compelled to drain his house; and that when he did, he was forbidden under a penalty to connect his privy cesspool, even as an overflow, with the sewer.

As an illustration of the large areas left undrained, I will quote from the evidence of Mr. James Peake, Surveyor to one of the Commissioners of Sewers. When asked if there was any sewer from Virginia Row to Shoreditch, a mile in extent, also as regards numerous courts in Whitechapel, he replied there was none. Speaking of the first-named area he said '1 cannot speak as to the state of the inhabitants, I know it is very wretched. The whole of this land was excavated for brickmaking, and has been reduced to an unnatural level'; and as regards the latter, that it is the filthiest place imaginable and densely populated. But he added that he did not consider it to be any part of his duty to alter or carry up a sewer with reference to the health of the inhabitants, but only as regards the necessities of the adjoining property. Is it to be wondered at that typhoid fever, diarrhœa, and similar diseases made these localities their permanent place of abode? The Commissioners of Sewers not only neglected to make sewers where they were most urgently required, but when asked to trap the inlets to those already made, they decided that the 'stink should not be kept down', as the sewers must

have vents somewhere, and it was better to have them in the street than in the houses. The regulations also of the different commissions were not the same, so that a man having property in Finsbury, Westminster, the City, or Tower Hamlets might find himself subject to a penalty for acting in the same manner in all these divisions of London. There was, however, one fortunate circumstance arising out of these divisions, viz., that Mr. Roe, the engineer to the Holborn and Finsbury Commissioners, was a scientific and practical man, who made the new sewers in his district of an egg-shape instead of a circular form, and thus proved, before the Metropolitan Board of Works began their system of drainage, that the egg-shape, or a slight modification thereof, is the best form for making sewers. He also pointed out the ease with which sewers can be cleansed by flushing with water.

Evidence was also given at the same commission as to the condition and construction of house drains, which I am sorry to say is applicable to a large number of drains at present. In answer to questions it was stated that the builders generally put in the drains anyhow, so that sewer gas frequently found its way into the houses. That, in his (Mr. Oldfield's) opinion, house drains should be made entirely by the persons in charge of the sewers, or under the immediate control of officers having competent skill; and that drains should not be covered up until they had been thoroughly examined by these officers. If this were done even now, much suffering and many deaths would be prevented.

This enquiry, supplemented by the labours of Dr. Southwood Smith, Mr. Edwin Chadwick, and many others, having made manifest the evils arising out of the imperfect drainage of London, an Act was passed in 1855, entitled 'The Metropolis Local Management Act', which gives power to the Metropolitan Board of Works not only to construct and maintain main sewers and the appurtenances thereto, but also to control the construction of local branch sewers to be made by the Metropolitan Vestries and District Boards of Works. In pursuance of these powers the Metropolitan Board has expended the sum of £5,625,969 in carrying out their scheme for the main drainage of London, and also repaid the sum of £275,000 which had been borrowed by the old Commissioners of Sewers. The sewers at present constructed not having been effectual in preventing the flooding by storm-waters of many parts of London, a number of new sewers, termed 'storm relief sewers', are about to be made, at an estimated cost of £708,000. These have been rendered necessary by the extension of the Metropolis and consequent substitution of the impermeable surfaces of roads, roofs of houses, and paved yards for absorbent grass land, and the additional sewage of the new houses. It can scarcely, however, be considered that the present scheme is final, as the state of the Thames even at Gravesend, is anything but satisfactory, whilst near the outfalls the stench from the river this year has been exceedingly bad, so that before long a very large additional sum must be expended in providing a new outfall nearer to the sea. Some idea of the extension of London since 1856 may be formed by the rateable value of property, which was then 11¼ millions, and has now increased to about 27½ millions.

In addition to these works the Metropolitan Board have constructed the Victoria, Albert, and Chelsea embankments and approaches at a cost of nearly 4½ millions; made the Northumberland Avenue at an expense of £704,000; and other street improvements, which have cost about £5,500,000. They have expended £860,000 in purchasing and pulling down injurious dwellings; have spent £417,500 on parks and open spaces; and no less than £1,448,000 in freeing Metropolitan bridges from toll. All these have been done in accordance with Acts of Parliament conferring on them the necessary powers to do these things, and in addition to carry out other useful measures for improving the well-being of the inhabitants of this Metropolis. Amongst these I may mention the Buildings Acts and clauses of the Metropolis Local Management Acts, by which the Metropolitan Board of Works have control over the formation of streets and the line and height of buildings therein, and the materials to be used in their construction. By the Act of 1878 they have power over the building of theatres and music halls, and what especially concerns the health of future inhabitants of new houses, authority to require the covering over with concrete the whole foundation of houses built on made ground.

They have also, under the provisions of the Slaughter-houses Act, issued bye-laws for the conduct of the following businesses, viz., a slaughterer of cattle, the business of a knacker, blood boiler, bone boiler, manure manufacturer, soap boiler, tallow melter, tripe boiler, catgut maker, fat melter or extractor, and, I think, some others. They have also issued bye-laws for the proper management of cowsheds, dairies, and milk shops, and, as regards the two latter, for keeping the milk in a clean and wholesome condition, and for preventing its contamination by any person suffering from a dangerous infectious disorder. As regards slaughter-houses and cowsheds, the Vestries and District Boards have powers somewhat in excess of those possessed by the Metropolitan Board of Works, which have in some parishes led to a conflict between the officers of the two authorities. The Metropolitan Board have to administer one hundred and ten Acts of Parliament, ninety of which directly or indirectly have a tendency towards the improvement or preservation of the public health of this great city. I would also mention the Metropolitan Asylums Board and the Boards of Guardians, the former of which, although a Poor-Law Authority, provides hospitals for the isolation and treatment of those suffering from dangerous infectious disorders, and the care of imbeciles, whilst the latter, by its medical and relieving officers, provide for the treatment and sustenance of the sick in their own homes. A very large amount of structural work has also been executed by the Vestries and District Boards of the metropolis.

In 1874, a statement was compiled and published by the Metropolitan Board of Works from returns supplied by these Local Authorities, showing that during the preceding eighteen years 635 miles of new sewers had been constructed at a cost of £1,731,474; that 7,198,607 square yards of paving had been laid down at an outlay of £3,038,406. Also that £709,395 were expended on other street improvements, and £587,592 on other sanitary works, the total expenditure amounting to £6,067,228. They had also added 17,480 new lamps to those in lighting before 1856. The length of streets and roadways under their control was 1,410 miles in 1874, against 925 in 1856. During the seven years which have elapsed since the date of this return a very large additional amount of sanitary work has been carried out; and it is as well to state that several of the Vestries and Boards did not make a return under

dings, so that the total sum expended in was in excess of that just mentioned.

arliest modern permanent legislation for the of nuisances, and the prevention or mitiga- epidemic, endemic or contagious diseases om the passing of the Nuisances Removal seases Prevention Act, 1848, which was d in 1849. There was, however, a temporary sed previously, in 1845 or 1846, to which I t further refer. These Acts were supple- in 1860 by an Amendment Act, and in 1866 ublic Health Act, more commonly known as tary Act, 1866, which materially altered the sanitary law.

owers conferred on Local Authorities are so wn that I need not allude to them in detail, merely say that they enable Local Autho- ongst other things to require the repair of nises which are in such a state as to be a and injurious to health, so that with a due of pressure on the part of Medical Officers th the provisions of some of the Artizans' s Acts need not be enforced. I think it generally admitted that the powers of the es Removal Acts, if actively carried out, are t for the removal of most nuisances, although e certain difficulties in the mode of pro- especially as regards trade nuisances. I und the abatement of these to be both me and expensive, as well as, in many in- unsatisfactory. There are, however, other in these Acts which appear to have almost notice in some parishes, viz., the prevention smoke escaping from chimneys attached to used for driving steam engines, or for any rposes whatsoever; the provision of a mor- d of a room for making *post mortem* ex- ns, and one or two others of less import-

assing of the Sanitary Act in 1866 consti- new era in sanitary legislation. It is true as passed during a time when cholera was ; as, indeed, the Amended Nuisances Re- ct was; but it is none the worse for that. st important clauses are (*a*) the 20th, which shall be the duty of the Nuisance Authority from time to time an inspection of the dis- th a view of ascertaining the existence of s, and of enforcing their removal.' It is to ed that the word is 'shall', and not 'may'; I believe that this very important clause has carried out in its entirety any more effi- r generally than if the usual word 'may' had ployed. I know that in several metropolitan and districts a regular and systematic in- of most of the poorer houses is made, but it is more or less neglected. It will be that the word is 'district', so that no excep- ade as regards the better class of houses, or nises whatever.

er very important set of provisions are those mpower the Local Sanitary Authorities to the clothes, beds, bedding, and other hat have been exposed to infection; to re- e owner or occupier of a house in which s been an infectious disease to disinfect the to do it themselves; to maintain carriages onveyance of the infected sick; and to pro- hospital for the reception of the sick. All ties are permissive, except that of serving er or occupier of a house with notice to dis- which is imperative. There are other well known clauses for preventing the spread of infectious diseases, which forbid the exposure of infected persons and things.

There is another important clause, viz., the 35th, which empowers the Sanitary Authority, with the sanction of the Secretary of State, to make regulations for houses let in lodgings. In many parishes and districts this has not been carried out; in some the regulations have been made, but are rarely enforced, whilst in others they have not been made at all. It is also to be regretted that the regulations differ very much, so that what is overcrowding in one district is not overcrowding in another. The providing of hospitals for the sick by the metropolitan Sanitary Authorities has been almost entirely ignored, except as regards a few for small-pox, as it is considered that it is better that there should be only one authority, and that a central one, for carrying out this obligation; and it is, therefore, generally left to the Metropolitan Asylums Board. I must say for myself that I think this to be the best plan.

The Metropolis Local Management Act conferred upon the Local Authorities the powers of the Paving and Sewers Commissioners, so far as their own districts were concerned; and I think it will be admitted by all who are acquainted with the work that these powers have been fairly used. The amount of work done, and money expended, has been enormous, as was shown by the report to which I have already referred.

There is, however, in my opinion, one unfortunate and important omission, viz., that the Local Authorities have not generally made regulations, which they have the power to do, for the making of drains of such level, direction, form, and manner, and of such materials and workmanship, and with such branches thereto and other connected works and apparatus, and water-supply, and water-supply apparatus, as they shall order. Also for the making of such drains under their survey and control. If the works are not done to their satisfaction or to that of their officers, they may either alter, amend, or reconstruct the same at the expense of the owner of the premises, and summon him for the penalties provided by the Acts. I have referred to these at some length, as the power to make regulations for carrying out these important works, and for their strict supervision whilst in progress, are not sufficiently used. For want of these regulations a very large proportion of the waste-pipes from kitchen sinks, baths, wash-basins, and even cisterns are connected directly with the house-drains, and the inlets are only protected by bell-traps, or as regards the last-named are not trapped at all. Rainwater pipes having their heads near bed-room windows are frequently connected with drains without a trap. I need scarcely say that the sanitary condition of a house in which these defects exist can only be described as bad, and even as being dangerous to the health of the residents.

The law as it at present stands, as regards the isolation of persons suffering from infectious diseases, is also defective, because the words 'being without sufficient lodging and accommodation', have been ruled to refer only to the patient, and not to the other occupiers of the house. This requires immediate amendment, as a Medical Officer of Health ought to be able to obtain an order for the removal of a person so afflicted, who cannot be properly isolated from healthy people. We also want legislative measures to make the registration of infectious diseases compulsory, and to provide additional hospital accommodation for cases of dangerous infectious

disease, without exposing those making and conducting them to actions as at present, provided they are made and conducted in the best possible manner, and to the satisfaction of some competent central authority.

As twenty-five years have passed away since Medical Officers of Health were appointed to the metropolitan districts, it may be useful to take a cursory glance at the progress made. The works carried out by the Metropolitan Board of Works, and by the Vestries and District Boards, have already been referred to; and I need scarcely remind those who were familiar with London thirty years ago that it ought to be a much more healthy place of residence now than it was then, even although its bounds have been very greatly extended, and the population increased. Not only have numerous uninhabitable dwellings been removed, and in many cases replaced by better built habitations, which are less overcrowded, but many of the streets have been widened, and new streets made through densely crowded poor neighbourhoods. A very large number of cesspools have been emptied and filled up, and replaced by water-closets connected with the sewers; the yards behind the houses of the poor have been in most instances properly paved and drained; the houses themselves frequently whitewashed; and other sanitary works performed. Overcrowding has been diminished in many localities, and the density of the population in the City of London also much diminished. To show the amount of work carried out in my district I may state that since 1855 as many as 6,965 cesspools have been abolished; 10,898 choked drains have been either cleansed and repaired or reconstructed; 2,084 yards have been provided with means of drainage; and 4,518 repaired or newly paved; additional means of ventilation have been supplied for 2,939 houses; and a better water-supply, or improved water-supply apparatus, provided for 5,119 houses. In addition, since 1866, above 6,000 houses have been inspected annually, and all those requiring it have been regularly whitewashed, cleansed, and repaired.

As, doubtless, as much or more sanitary works have been done in other parishes and districts, there ought to be a decided improvement in the death-rates of the metropolis. On making an examination of the returns of the deaths registered in London I find that in the decennial averages since 1840 the death-rates at all ages and from all causes taken together are lower than they were, as in 1841-50 the mean was 24.87; in 1851-60, it was 23.77; in 1861-70, it was 24.43; and in 1871-80, only 22.79 per 1,000 inhabitants. Indeed, during the last decade it was lower than the number just stated, as the population of London was decidedly underestimated. As the death-rate at all ages, and from all causes, is not considered so good a test of the sanitary condition of a locality as the proportion of deaths of infants under one year to the total mortality, and especially to each 1,000 births, I have ascertained these, and with, to me, somewhat unexpected results.

In 1841-50, the proportion of deaths of infants under one year to total deaths in London was 19.97 per cent.; in 1851-60 it was 21.91 per cent.; in 1861-70 it was 23.56 per cent.; and in 1871-80 it was 24.87 per cent. The annual increase for 1851-60, as compared with 1841-50, was 1.94 per cent.; for the next decenniad, 1.65 per cent.; and for 1871-80, 1.34 per cent., being a diminution of 0.32 per cent. in the rate of increase for each decennial period. If this should go on at the same rate up to 1891-1900, the proportion would be 25.51 deaths amongst infants out of each 100 deaths at all ages. The annual mortality of infants under one year to 1,000 births was 157 in 1841-50; 155 in 1851-60; 162 in 1861-70; and 158 in 1871-80. There is, therefore, no improvement shown in this age period of the population. If we turn to the zymotic death-rate of London, and compare it with that of all England, the retrospect is a little more satisfactory, as for each decennial period the annual numbers per 1,000 population were 4.44, 4.55, 4.79, and 3.85; or for the twenty years 1841-60, 4.49; and for 1861-80, 4.32. The reduction in 1871-80 in the death-rate from these diseases was almost entirely due to a smaller number of deaths from typhoid fever. It is true that there was a diminished number from scarlet fever, but these were counterbalanced by the excess from small-pox. To show the relative number of deaths from the chief zymotic diseases, I quote the following from the last annual summary of the Registrar-General. Weekly average, 1840-79: deaths from small-pox, 19; measles, 29; scarlet fever, 47; diphtheria (twenty years), 9; whooping-cough, 45; fever, 40; and diarrhœa, 48; so that diarrhœa and scarlet fever have produced the largest mortality amongst these diseases.

Although the figures I have just given show that, the fear expressed by some sanitarians that improved sanitary measures might have the effect of prolonging the lives of weakly children, and thus eventually deteriorating our race, is unfounded, yet they indicate the great necessity that exists for protecting our infants from vicissitudes of weather, of affording them plenty of warmth, and especially of avoiding the process of so-called hardening, which has led to the loss of so many lives. Whilst, however, undue exposure to cold is to be avoided, yet the access of fresh air to the living and sleeping rooms should not be prevented; plenty of good suitable food should be given, and the interior of the dwellings should be kept as clean and free from nuisances as possible. The comparatively small mortality amongst the infants of the professional and upper classes, about 8, during the first year of life, out of every 100 born, against about 20 amongst the poorer classes, show the frightful and unnecessary waste of infantile life. It was too much to have expected that during the short period under review, any great improvement had taken place in infantile mortality, but it is much to be regretted that the sanitary measures, which, with better food, clothing, and houses, have so decidedly improved the health of the elder children and adults of this great city, have not also exercised a decidedly favourable influence on the health and longevity of our infantile population.

Before concluding I again desire to express my conviction that imperfect construction of house-drains, for want of proper supervision, and the numerous inlets which frequently exist for the entrance of sewer-gas into houses, cause much injury to health, and may account to a certain extent for the high death-rate of young children. By sewer-gas I do not allude only to gas from sewers, but especially to that evolved from foul or partly choked house-drains, which I believe to be far more injurious than ordinary sewer-gas. The most common way by which these gases enter houses is by the pipes from kitchen sinks or baths and wash-basins which so frequently communicate, as well as the rainwater pipes, directly with the house-drains. These should, wherever possible, be cut off, and, if not, should be properly trapped. Bell-traps should never be used, as they

as traps, and are frequently used as play-
pecially by the children of the poor. I
t particularly on these defects, because I
ssed much injury to health from their ex-
d also because the number of inspectors
employed in most of the Metropolitan
nd districts is not sufficient to find out and
e as well as other nuisances. I believe
t as regards the subject just mentioned,
legal powers for the abatement of nuisances
necessary at present as an increased staff
lical Officer's and Surveyor's departments
lly carry out the existing laws.

SANITARY STATE OF ROME.

LAUCHLAN AITKEN, M.D., Rome.

(*Continued from page* 50.)

THE CLIMATE AFFECTS ENGLISH AND AMERICAN RESIDENTS AND VISITORS.

ing articles the death-rate of Rome, and
es which prevail and cut off the native
, have been fully considered, and it now
show how the climate and sanitary state
affect English and American residents and
y practice not including a sufficient number
rs of other nationalities for any authori-
ment in regard to them on my part. It is
at what is true of the English and Ameri-
true of all other foreigners, and, as nearly
of the foreign visitors in winter are from
ain and the United States, there can be no
in the general results. Of those it may
l, without fear of contradiction, that by far
number go to Rome in fear and trembling.
anticipation of delight from a visit to its
treasures, the longing which Christians
enomination have to see its shrines and to
thin its walls, the desire of the historian to
cords, of the antiquary to examine its ruins,
st to paint in a climate whose skies reveal
e secrets of colour, and of the man or
fashion to take part in its amusements and
ociety,—these, and such as these, are the
ts which lead most of the foreign visitors
he dangers which, they are assured, are
e from yielding to the temptation. And
do so, and the number of visitors rather
ncrease than to diminish, though it is also
at the average duration of their stay
horter year by year. And this, probably,
son of the belief in the unhealthiness of
ming more and more deeply rooted among

r days, the strangers came to the city for
and settled down quietly, mostly in private
s, in the pensions, or in the sunnier rooms of
They took life easily, saw the sights and
galleries in a leisurely way, were present
ch ceremonies, walked, rode, and drove a
on the Campagna, and entered moderately
ocial life of the place; in short, lived
es. Now, the belief in the danger of
n Rome is so firmly fixed, that the visitors
est thing to do is to get out of it again as
ssible. They live massed together, mostly
hotels, are out from morning to evening
sight-seeing harder than they ever do at
sions or businesses at home, eat largely at
te, sit for hours in asphyxiating reading
rooms and *salons* often engaged in discussing the dangers of the climate, or rush off to opera or theatre, to ball or reception, thus thoroughly exhausting their nervous systems, undermining their strength, and predisposing themselves to illnesses of every kind. Such a life—and the picture is not overdrawn—is necessarily more dangerous to the unacclimatised strangers in Rome than elsewhere, and, proportionately, there is no doubt that attacks of illness are much more numerous among such imprudent visitors than they are among residents of the same nationalities who understand the climate and adapt their lives to the requirements which the Romans themselves advise and observe. It need scarcely be said that the manner in which the English and Americans work at sight-seeing excites the most genuine amazement in the Italians, and confirms them in the belief that the members of those two nations are, as a rule, more or less eccentric.

But though there has long been a consensus of opinion among Romans and foreign residents of any standing in Rome in attributing the illnesses of the visitors to their own imprudence, physicians who have much practice among those visitors cannot entirely agree in such a belief. There are many cases of illness occurring among travellers in Italy which are due, not to the fault or imprudence of the victims, but to the want of sanitation in its cities, to the contamination of the air, the water, or the food by the germs of disease, and to the complete ignorance of the visitors that there are certain climatal conditions requiring precautions they do not need to observe in their own lands. Strangers might be as imprudent as they chose, but they could not be attacked by a malarial or a typhoid fever, unless they were directly exposed to the perfectly preventible causes of these complaints. That such cases of typhoid and malarial fevers do occur among visitors to Italy is disputed by no one, and, indeed, it is the exaggerated belief of late years in the frequency of the attacks, which has induced so many foreigners to prefer the French Riviera, Algiers, or Egypt, to Italy as a winter residence. It would be difficult to find the data for even an approximate estimate of the number of cases occurring annually among travellers throughout Italy, and I am unable to answer for any part except Rome. As it is the Capital which has the worst name, it is, perhaps, more necessary to inquire how visitors are affected in it than in other parts of Italy.

There is probably no combination of words which has produced more impression on the minds and imaginations of travellers than has the term Roman Fever. To most of those, no doubt, it seems to have a definite meaning, it expresses what they understand is a prevailing danger, it proves a serious drawback to the pleasure they anticipate, and, in many instances, it even compels them, however reluctantly, to abandon their intention of seeing Rome. And yet were they asked to say more particularly what Roman Fever is they would be quite unable to reply. Precise and exact as the words appear, they carry no meaning with them to medical men. The residents, too, are often very puzzled to know what the illness is, as strangers include under the generic term all kinds of ailments, from a simple cold to a severe enteric fever, and it is sufficient to have fallen ill in Rome to be credited everywhere with being the victim of that vague disease. The truth is, there is no such complaint. There are malarial fevers varying in severity, typhoid fevers, scarlet fevers, and others equally well known, but no fever so peculiar in its

nature as to permit of it being christened with the name of Rome. One form of malarial fever does take a somewhat continued course, that is, it does not assume the intermittent or remittent type, but similar forms of illness arising from malarial poisoning have been described as occurring in other parts of Italy, in the United States, and in India, so as to exclude any idea of it being confined to Rome or its vicinity. To this form the name 'sub-continuous typhoid' has been given by Professor Baccelli of Rome. The term, fortunately, has not become widely known, for though the fever may be looked on as subcontinued, yet, in whatever sense we take the word typhoid, the epithet is misapplied. If we regard it as used to express the group of symptoms called typhoid, or the typhoid state, my experience contradicts such a use, none of the cases I have treated throughout having presented the features which are classed under this heading. On the other hand, as Baccelli does not look on the fever as the product of the union of the malarial poison with that of decomposing excrementitious matter, and clearly expresses his belief that all the other morbid elements in the cases—rheumatic, bilious, or typhoid—become subordinate to the malarial, I am at a loss to know in what exact sense he uses the term typhoid. In an article on this subject, published in the *British Medical Journal* early in 1878, I preferred to regard these fevers as malarial in origin, though they presented a remarkably continued course, and it was very difficult to discriminate between them and mild enteric fevers. I am still inclined to look on some cases occurring among visitors in certain seasons as of this type—the seasons being usually too mild—while in other colder winters, as in 1879-80, they did not present themselves at all. But further experience induces me to be cautious in underestimating the possibility of many such cases being really mild enteric fevers modified by a malarial element in the climate, in fact typhomalarial fevers, though I have had no post mortem examinations to clear up my doubts, the patients having all recovered. I do not, however, question the occurrence of the type of fever among natives, which Baccelli and others have described as subcontinuous typhoid and have regarded as malarial. All the Italian practitioners in Rome look on this as a settled matter.

The cases of this kind occurring among strangers have usually seemed to arise directly from a chill, as in those described in the article mentioned. Thus, a young English lady, aged 22, goes to an evening party after a fatiguing day's sight-seeing, dances until well on in the morning, stands, when perspiring, at the door awaiting her carriage, gets a chill, and the next day is laid up. Another patient, an English gentleman, aged 28, after a hard day's work with the hounds on the Campagna, arrives much overheated at one of the gates about sunset, dismounts there, and drives to his hotel in an open cab, without putting on a great coat, and developes an attack two days afterwards. Again, an English clergyman, aged 30, reading with some Oxford students, has one of the headaches to which he is liable, and, after a long heating walk to get rid of it, sits down on the grass outside one of the city gates, and gets a pretty severe illness. In almost all the cases the exciting cause seemed to be a chill when the body was overheated, and its power of resisting cold diminished by previous fatigue, mental anxiety, or chronic ailments, or by exposure during the night, when the heat of the body is naturally lower, or from visiting some notedly malarial locality, as Ost Hadrian's Villa, and so on.

It is quite unnecessary to do more than refer t the article* spoken of for a description of the illnes The symptoms have usually been mild, the cours not very prolonged, except in one or two patient who had relapses, or in whom complications, such as pleurisy or bronchitis, supervened. All the patient recovered, and none, so far as is known, have bee rendered more delicate by their attacks. In uncom plicated cases, therefore, in average health, the prognosis is very favourable. When we hear, then, in Rome of patients dying elsewhere of Roman fever it is obvious that the complaint has either been enteric fever, or, if of the type described, that the patients have exhausted their strength by travelling too quickly and too far, and have thus foregone the benefit of treatment in time to assure their recovery, or have had more grave complications than any of my cases. It is a most common and most deplorable practice for visitors, when they feel ill, to rush frantically away, in the hope that such flight will prove curative. It is certain that many deaths have been due to this cause, and there is scarcely any illness we know which is not aggravated by such a proceeding.

Although the belief in a malarial element in the climate of Rome is universal, yet the poison is so dormant in the winter months, that the residents who can afford to live well, in healthy quarters within the walls, scarcely suffer from it, nor, as a rule, do the visitors who live in apartments. Many an Englishman has lived fifty years in Rome without an attack, and without further precautions than are implied in the fact that such residents usually quit Rome in the autumn months. Agues of any kind, quotidian, tertian, or quartan, are rarely met with, either among the foreign residents or the season visitors, and are easily cured when they do occur. More severe malarial fevers, of the pernicious type, occurring among the peasants who reap the crops or till the Campagna, are almost unknown. I have seen such cases in the early winter months among the poorer classes who had lived in Rome during the autumn and had then contracted their fevers. No doubt it is sometimes stated that this or that foreign visitor has died from 'perniciosa', but no such cause of the death of an English or American person is entered in the list kept at the Protestant Cemetery for the last six years.† It is also certain that much more quinine is taken by visitors on their own account, or recommended by their physicians, than is at all necessary. It is quite a common occurrence to be called to see visitors whose only complaint is cinchonism, and requires no further treatment than the giving up of the drug they have such faith in. Another notion prevailing about Rome, and found even among well-informed physicians, is that there is a thread of malaria running through all the illnesses occurring there, and requiring the addition of quinine to the ordinary treatment. This is very far from being invariably true, and much harm has been done by the injudicious use of quinine under this impression.

If, then, the greater number of the cases of fever among visitors, not only in Rome, but all over Italy, are not malarial, what are they? It has long been certain that they are typhoid or enteric in character,

* *British Medical Journal*, April 27, 1878.

† In the spring of 1879, a well-known English visitor died at Albano from what was then said to be 'perniciosa', but the attending physician did not so enter it in his certificate.

erially from those somewhat continued alluded to.

or American traveller, who has been nderstand the laws of hygiene, can being struck with the gross neglect of ntary principles which he finds in every ıtinent. The sights which everywhere , the odours which pollute his nostrils, ss in dealing with the water he drinks, erious obstacles to his enjoyment. It , with rare exceptions, the public and ion of the continent is nearly a quarter ehind that of England and America. not apply to the more remote or less nly. Paris, Naples, and Munich, have reputations for typhoid as Rome for Florence for diphtheria, and St. Peters- ıus. It is unquestionable that the bers of the English and American travelling, are more liable to contract o the want of proper hygienic appli- e inhabitants of the various countries . certain extent, become habituated to r conditions under which they live. stant outcry in the public press of the gainst the dangers of residence or ɔad; and it simply depends on the ear as to what part of the continent ed against. In summer it is one or as of Germany, the North of France, of Switzerland; in winter it is Italy. the season comes round we hear in ınhealthiness, and it does not seem ıere should be much difference, either ɔed nature of the abuse, or in that of ıich that abuse calls forth, as long as ıitary conditions exist, except in so far of illness is dependent on the number

ıe, therefore, let us see how English visitors have been affected by such ıesses as diphtheria, typhoid fever, of late years. I have the returns of ɔf Protestant members of the nations ch have been registered at the Capitol* ning of the season, 1876-77, *i.e.*, from of the former year up to the end of There are in all these five years 67 e still-birth. In one out of the 67 ıe is not stated in the official books. hat of a boy aged 4½, the death is liphtheria, the infection in this case brought from Paris.* Two deaths small-pox;† so that diphtheria and ot be looked on as serious dangers in of the 66 deaths are referred to any ial fever, but no fewer than 16 are n typhoid, an average of a little more ıally. This certainly does not seem a amongst the English and American ıust have been about 100,000 in the proportionately to the deaths it is so. own in the previous article, nearly 2 100 deaths are from typhoid fever. Among the visitors spoken of it is 16 out of 66 deaths, or quite twelve times as many. Dysentery, whooping-cough, puerperal fever, and septicæmia, are each answerable for one death, but no other zymotic disease is mentioned; and the greater number are referred to phthisis, diseases of the heart, bronchitis, pneumonia, apoplexy, and Bright's disease. It is only necessary, therefore, to enquire into the reasons for the deaths from typhoid fever, and it is clear that they depend upon the defects in sanitation alluded to.

It is now generally believed that the typhoid germs find their most favourable nidus in decomposing sewage, and that the poison is thence conveyed to the air, water, or food; direct communication from one person to another being only admitted in exceptional cases. In many parts of Italy, as in Venice, Naples, Palermo, and, to a less extent, in Florence, the drinking-water is bad, well-water being frequently used, and the danger of wells in cities being poisoned by sewers leaking, and the sewage getting into them, is generally recognised. The sewers are almost always built of stones or bricks, are of a bad shape, and often in want of repair, while the subject of their ventilation and flushing receives no attention. The house-drains, too, are, as a rule, constructed of bricks or tufa, not lined with any impermeable cement, rarely ventilated thoroughly, and never properly disconnected from the sewers by any efficient and well-ventilated traps; while the waste and overflow pipes of sinks, lavatories, and baths, are treated in the same careless way; and the modern trapped, ventilated, and well-flushed closet-basins are, it may be said, absolutely unknown.

Defects such as those were found, more or less, in every hotel in Rome examined by a commission of medical men, formed at the suggestion of the *Italian Times*, an enterprising English newspaper published there, and in the report of the members of that commission, some of whom have travelled a great deal on the continent, it is distinctly stated that they believe a similar want of modern sanitary appliances and like defects of construction would be found, not only in every hotel in Italy, but in almost all the hotels of the continent. In Rome, as shown in the previous article, the great danger of contaminated water does not exist, and for the reasons there stated the Trevi may be taken as one of the purest drinking-waters supplied to any large city in the world. Unfortunately, it is only found in one part of Rome and much of it escapes unused into the drains, which are thus constantly and abundantly flushed in the quarter it supplies, a quarter which includes most of the hotels and apartments frequented by visitors. The risk from escape of sewer-gas into the houses, too, is, to a certain extent, obviated in some parts of Rome and other Italian cities by the more primitive arrangement of the closets on balconies outside the house-walls; and it is, therefore, owing to the want of some proper means of disconnecting the house-drains from the sewers, and ventilating and trapping them, as well as the sinks, baths, and so on, that the cases of enteric fever are probably due.

In Rome it used to be maintained that many, if not all, such enteric fever cases came from Naples: in Florence, and on the Riviera, Rome was the culprit. But this is obviously nonsense, and most pernicious nonsense, as serving to withdraw attention from the true sources of danger which are common to all. No doubt more people do congregate in Rome at certain seasons, and stay probably a longer

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very English and American Protestant, as, whether it, the bodies are invariably taken to the Protestant names registered at the Capitol. It would have to get the number of the Catholic deaths among the nations, but it must have been very limited, as I one Catholic who has died in the same five years. ignor Trucchi for the returns from the Protestant ok much trouble to ensure their accuracy.
physician.

time, so that we may find more cases there at one time than in other cities; but, as Rome is free from the danger of impure water, it is more than likely that it is not answerable for the origin of such a large proportion of the cases as other places less favoured in that respect. In some seasons, of course, more is heard of fever in Rome than in others, and this depends on their being milder, on greater overcrowding, or on the accidental introduction early in those seasons of such cases.

In a pamphlet addressed to the members of the International Medical Congress held in London in 1881, Dr. Toscani, the Director of the Municipal Office of Hygiene in Rome, combats the idea of the frequent occurrence of such cases in the hotels of Rome, on the very strange ground that he had only registered three deaths from typhoid fever as occurring among the 60,000 visitors to Rome in the season of 1880-81, which, it had been maintained, was an unhealthy one. Surely Dr. Toscani does not believe that every case of typhoid fever dies. The type among visitors is often a mild one, and as the sufferers are usually able to afford to pay for good attendance, careful nursing, and proper nourishment, the proportion of recoveries is fortunately large; but that does not diminish the hardship implied by such attacks among the visitors. Had Dr. Toscani applied to any of the foreign medical men in practice among the strangers, his pamphlet would probably not have been written. It is curious, too, that the Director of the Municipal Bureau should under-state the mortality, but so it is. I find that in the period he takes, from November 1st 1880 to April 30th 1881, there were registered at the Protestant Cemetery one English and three American deaths from typhoid fever; and another English death from the same cause was registered on the 9th of May. How then does Dr. Toscani make out that only three foreigners died in the same period from that complaint. Did no French, no Germans, no Russians, no members of other nations die from that cause? I heard of the death of one Frenchman at least from it, and of more than one other foreigner. If the deaths were not entered as from typhoid fever, then the statistics of the municipality are of no value, and, as Dr. Toscani has no practice among English and American visitors, his statements would not rest on any satisfactory basis.* He is, too, one of the believers in the theory that the enteric fever cases of Rome are almost invariably imported from Naples or elsewhere, forgetting that such an argument tells both ways, and that the Neapolitan and Florentine physicians and hotel-keepers are quite as ready to blame Rome. It may be added that if he had himself been at the International Medical Congress, he would have met English physicians eager to tell him of cases occurring on the Riviera or in England, which they firmly believed had their origin in Rome this season.

Visitors will not be persuaded by any figures which Dr. Toscani can bring forward, but they would be reassured were proper attempts made to remove the defects in the construction of sewers, drains, soil and other pipes, which have been proved to exist as much in Rome as in other cities. The hotel keepers of Rome have been wise enough to see that it is for their interest to do what they can to improve their houses, and the recommendations made by the com of medical men referred to have been ch accepted by them, and will, when fully carr go far to remove the most glaring of the evi plained of. True, Rome will still suffer by i tion of cases, but public opinion will soon other cities to follow the good example set Capital, and with a bettered sanitary condit outcry against the risks of foreign travel will disappear. It is certain, too, that with the dis ance of these risks, the term, Roman Fever has been so injurious to the interests of would soon become only a recollection of the

In what has been said in this article, the ir of the diseases prevailing in Rome, and of its on the health of the foreign visitors, has alor dealt with. It is not intended to speak favourable effects of a residence there in mar of chronic bronchitis, asthma, certain forms of phthisis, Bright's disease, hypochondriasis, an Such details would require a volume, not an only. But as long as there are dangers fror in Italy, a few simple precautions may be st likely to be useful to visitors. Among the most necessary to refer to the water, which only be used unboiled when guaranteed b local physician of repute. No filtering, no with wine, brandy, or lemon-juice, make c nated water safe; nothing short of boiling do and the insipidity of such boiled water may rid of, when it has cooled, by adding a few c lemon-juice, some good wine, or using it as w Syphons are only the unboiled water of th where made, with carbonic acid gas forced and are often thought to be even more da than the water, but there are now so many springs which give good table-waters, as St. C Apollinaris, Natural Seltzers, Giesshuebler, and others, that we need be at no loss to w turn when it is impossible to get the water and when the traveller is unable to drink good wine, or much weak tea. Visitors should live the houses, unless there are very good reas not doing so, not only with the view of getting their rooms, though that, too, is most valu winter, but also to be well above the street odours, and noises. They should never sleep rooms looking into narrow courts with little tion, and particularly when water-closets op the same courts, and they should try to be as these closets as possible. When living in apar they should select such as have the necessary niences on balconies, and when doubtful of th of the sinks, cisterns, etc., should apply t proper sanitary authority. In Rome, they w be told of a thousand and one precautions, ev of which is regarded as essential by the infor as, not to sleep with the window open, to be in sunset, to have special coverings for certair not to use cold baths in the morning, not much, not to go to this or that church, ga museum, not to drink this wine or eat that until the bewildered and anxious visitor finds multiplicity of precautions would render lif durable, and ends by neglecting all, even the e ones of avoiding a chill when overheated and n doing it by converting his pleasure into a toil unnecessary to enter into details. Visitors observe the ordinary laws of health as care Rome as they do in their own countries.

* As foreigners often wish to have their dead transported to their own homes, and as there is some difficulty in so doing if the cause of death is certified as from a contagious disease, it is easy to understand how, in the official statistics, such deaths may be attributed to complications, rather than to the real cause.

SUBURBAN DWELLINGS AND TYPHOID FEVER.

By DR. A. FARR, San. Sci. Certif. Coll. Phys. Edin.,
Late Medical Officer of Health for Lambeth (resigned).

AN outbreak of typhus fever occurs in some dingy tenement, and all London is astir; a public meeting is held, the Sanitary Authority is admonished, and the property condemned. Short work, and very properly too, is to be made of these infected cabins. Happily, however, typhus is very rare in the Metropolis, for, to the credit of an improved sanitary administration be it said, in nothing has it been more successful than in stamping out this ancient pest. But concurrently with the comparatively few cases which have caused so much sensational feeling and terror, we are informed that another type of fever, equally dire, is generally rife throughout the Metropolis—a fever not originating in the dwellings of the very poor, not a localised outbreak resulting from poverty or overcrowding, but widely distributed, and attacking all classes alike. At the present time, in the Stockwell Hospital, there are about fifty cases under treatment; at Homerton Fever Hospital there are upwards of a hundred; in St. Thomas's Hospital thirty-six; and at St. Bartholomew's seventy-three. But these figures relate only to those cases of which we receive cognisance, and have no reference to the still larger numbers that are being treated at their homes. And from what kind of dwellings do these fever-stricken subjects come? From such places as Charles Street, Lisson Grove? No; for dilapidated and filthy as these were, they do not present the same conditions which account for the spread of typhoid fever. Typhus fever is essentially a disease of poverty, engendered by respiratory impurity and a special kind of filth by which it is surrounded. Enteric or typhoid fever, on the other hand, is an excremental disease, due to sewage emanations and polluted water-supply; at least, whatever the specific poison be, these are the media through which it is spread as a result of defective sanitary arrangements. And in this respect, the modern suburban dwelling of the period is the chief offender. Pretty and attractive houses—the charming villa even, advertised as 'possessing perfect drainage and conveniently situated for rail and tramway service'—are not exempt. This is the class of property inhabited by a large proportion of persons who are prostrated with fever at the present time. It is here that fevers and diphtheria have their origin to an alarming extent; it is here that the services of the Sanitary Inspector are in most request, and where the causes, direct and indirect, which swell the total mortality to abnormal proportions, are found.

Take, for example, a known suburban district which, in twenty years, has doubled its population from 30,000 to 60,000 inhabitants, which means, that towards of 4,000 new houses have been added, not per cent of which, in a strict sanitary sense, are habitable. Multiply this by a number representing corresponding rate of increase all around London, and an idea can be formed of the extent to which phoid fever, diphtheria, and other diseases, by this eans are fostered and spread. Alas! it is only too e that every one of the sufferers now prostrated th typhoid fever is the victim of official ignorance every death the indirect handiwork of the specu-ing builder. If the present permissive sanitary ws, which have proved so utterly futile in remedying is state of things, were at once succeeded by compulsory legislation, making the builder and architect responsible to the owner for the efficient sanitary condition of every new building erected,—laws prescribing, at the same time, the method of drainage, the materials and sanitary apparatus to be used—ere the lapse of another twenty years the zymotic death-rate of London would be reduced one-third, and the mortality from all causes would be nearer 17 than 23 per 1,000 persons living. The time has arrived when, as sanitarians, we should no longer be content with a mean death-rate which is known to represent such a vast amount of preventible disease and suffering—such a waste of life and money. The health of some Metropolitan districts can be shown to have improved, it is true, but this is where the population has been more stationary, or in districts in which the added buildings have been of better drainage and construction; but the evils attendant upon the commoner class of buildings with which nearly every suburb is studded, have completely outstripped the present sanitary organisation. To wait for the spread of practical sanitary knowledge amongst the people will effect but little gain in regard of improved drainage. The law must be enforced with those with whom the responsibility rests. How true of the present day are the words which appeared in the *Economist* fifteen years ago, viz.: 'English legislation abounds in abortive expedients; it shrinks from difficulties. There is very commonly an admitted evil, and very obviously only one real remedy. But very often that real remedy is painful, and if public attention is but half roused to the subject, we are apt to put up with some half-measure, which gives little or no trouble, which looks as if it might mend matters a little, and which has no disadvantage, save that it is not a searching cure for the evil to be remedied, and that in a little while it will be forgotten on account of the slightness of its effect, while the malady itself will rage as much as ever.'

A SERIES OF REPORTS ON SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

IX.

LAMBETH RADIATING TILE STOVES, ETC.

I NOW draw the reader's attention to the Radiating Tile Stoves manufactured by Messrs. Doulton & Co.

The superiority of *fire clay* over iron as a material for the construction of stoves, although well known for many years, has hitherto been much overlooked in this country. This substance has a very remarkable power of absorbing a great amount of heat and of retaining it for a lengthened period, and it is therefore possible to construct stoves of fire clay which will thoroughly warm the air for many hours without any attention and without further addition of fuel. Moreover, whilst iron becomes quickly heated, it as rapidly cools, and for this reason it cannot be considered to be a satisfactory material for the construction of heating-stoves in which the object is to absorb the greatest amount of heat from the fuel expended, and to radiate that caloric into the air in a gradual manner, in order to secure an equitable and comfortable temperature.

With a view to obtain improved results, many stove

manufacturers have tried to remedy the evident defects of iron-stoves by lining them *inside* with fire-clay, and upon this principle nearly all the so-called 'Slow Combustion' stoves are constructed. But, without doubt, a serious objection to the use of iron for such purposes is the difficulty of preserving the surface from the oxidation and rust consequent upon so variable a climate. It has been usual also to cover the outer surface of stoves with blacklead, but this must be acknowledged by all to be a most unsuitable treatment, as needing constant renewal and giving a dark and unsightly appearance to the whole structure of the stove; besides being far from cleanly. This difficulty some manufacturers have met by coating the exterior with Japan lacquer, and still others again by the use of glazed and coloured earthenware tiles with which they cover the outer surfaces of the iron stove.

Considering that none of these remedies have proved entirely satisfactory, Messrs. Doulton have, of late, directed their attention to the production of a stove, which while internally constructed entirely of fire-clay, should at the same time present a cleanly and attractive exterior of great radiating power, and capable of a wide range of decorative treatment. Happily for the public, after a series of experiments extending over nearly three years, they have succeeded in attaining their end by the introduction of their Lambeth Radiating Tile Stoves, which are constructed entirely of glazed fire-clay tiles, of resisting the highest temperature on their surfaces, and yet so fine in exterior finish as of the most delicate ornamentation with the diversity of colour.

The *interior arrangement* is such that the greatest possib of heat is retained in the stove. By the adoption, also, of a internal flues, which carry the heated gases over all parts of before reaching the flue, a very considerable portion of the he radiated into the room. In stoves having an efficient flue this reaches three-fourths, or even five-sixths, of the heat p Moreover, by means of tightly fitting fire doors, and air valves therein, which can be adjusted at pleasure, the rate of co can be regulated with great precision. Thus a fire can, with experience, be arranged to burn twelve, twenty-four, or eve six hours, and, provided suitable fuel is used, no poking or of any kind will be needed.

These stoves are all arranged with air passages through and these may, if desired, be connected with the outer air. arrangement all air entering the apartment is necessarily wa passing through the stove, and a constant supply of pure wa secured. The nuisance of cold draughts is also obviated, as the free ingress of air through the stove provides sufficient w to replace the rarefied and ascending currents. In this pounds of coal will heat a room of 1800 to 2000 cubic fe

Example of Doulton's Radiating Tile Stove for Halls and Corridors, with statuary shelf above.

62 degrees Fahr. for twelve hours, being at a cost of abo per day.

One of the objections to iron stoves is th of overheating. As soon as this takes p small particles of dust floating in the air, c contact with the iron, become burnt and that unpleasant odour and sense of dryn invariably attach to iron stoves. This is from which the Radiating Tile Stoves ar

peculiar properties, as well as the great
of the material, prevent the possibility of
f the surface becoming overheated. To
equirements of conservatories and other
where an atmosphere containing moisture
d, the stoves are arranged with a water-
irectly beneath the outlet from which the
nters the room, and the air passing over
ies slightly moistened as it leaves the
Evaporators can also be fixed on vases
of the stove.

yet been invented which will consume its own gases, and possible until some new fuel shall have been discovered. of the stoves now in use produce no soot or smoke, yet to pass the carbonic acid and other gaseous products he air without rendering the atmosphere unhealthy. pplies equally to gas stoves without flues, in which the r aggravated by the addition of the sulphureous fumes e gas.

t is necessary to heat larger spaces, it is either, 1st, to place two or three stoves in rts of the room; or, 2nd, to have a stove

f Doulton's Conservatory Tile Stove, fed from the top, also with regulating valve.

made in portable sections all fed through ole and working into one flue; or, 3rd, to tove put together in its final position. The gement gives the most equable temperature; id is the most economical, and the fullest advantage is obtained from the heat produced; and the third plan occupies the least space, as the stove can, if desirable, be carried to the whole height of the room. I may as well add that, if required, the Radiating Tile Stoves can be constructed with an open fire-place; but it is, of course, impossible to obtain the full value of the fuel burnt in such a case. The decoration of the Radiating Tile Stoves is sufficiently varied to meet all tastes. They can be had in the following styles:—

(*a*) Hand painted in any design or colour to order to suit the surroundings.
(*b*) Modelled relief decoration, picked out in various colours.
(*c*) Modelled relief decoration, surfaced with richly coloured glazes, green, brown, buff, blue, violet, etc.
(*d*) Plain surface in colour glazes, as above, also natural colour of the clay, with transparent glaze.

The purposes to which the stoves can be economically applied are too numerous to mention. The following are the chief—

For Entrance Halls, Passages, and Staircases, etc.—They are found especially useful for the above purposes, as may be gleaned from the foregoing description.

For Surgeries, Ante-Rooms, etc.—For these the Radiating Tile Stove is admirably adapted, as no attention is required, and there is no danger of finding the fire out and the room chilly at a required moment.

For Booking Offices, Waiting Rooms, etc.—The fire doors can here be locked to prevent the possibility of the fires being meddled with. Ten minutes a day is sufficient to light, clean, and clear up the largest stove, and no further attention is required for twenty-four hours.

For Conservatories, etc.—In cases were a suitable temperature is required without unsightly hot-water pipes, these stoves are very advantageous. Specially made, a ventilating pipe conveys fresh air into the conservatory, thoroughly heated in passing through the stove without being burnt, and moistened by passing over the surface of a hot-water reservoir in the top.

For School-rooms, Play-rooms, and other places where safety from fire is especially an object, no other arrangement will adequately meet the circumstances. The radiating stoves need firing only once a day. The fire doors can therefore be locked up and the keys removed to prevent tampering. A pure and healthy atmosphere is always maintained, and the room can be kept constantly ventilated without the admission of cold draughts.

For Hospitals, Sickrooms, and Asylums, the Radiating Stoves can, if necessary, be so arranged that while the stove itself stands in the ward, the fire-doors for feeding and regulating are placed in the corridor or passage on the opposite side of the wall. On this plan a whole range of stoves can be fired in a few minutes by one attendant without entering or in any way disturbing the wards which they heat.

In sick-rooms, where it is desirable to keep a patient quiet, the stoves are an especial boon. There is no necessity for disturbance by firing up through the night. Neither need the patient be interrupted by ashes removal or stove cleaning, as these duties can be left for a week without detriment. The material being non-absorbent, the stove is valuable in cases of infectious diseases.

Heating two rooms with one stove.—This is accomplished by allowing the radiated heat to remain in the lower chamber or hall while the heated air passing through the ventilating pipe is carried upward into the room above. Where the house is small and the space to be heated is limited, this plan can be adopted with much success.

I trust that the foregoing descriptions will prove fully explanatory of these excellent novelties in the matter of sanitary stoves.

SANITARY INSTITUTE OF GREAT BRITAIN: EXAMINATIONS FOR LOCAL SURVEYORS AND INSPECTORS OF NUISANCES.—At an Examination held by the Sanitary Institute of Great Britain on November 3rd and 4th, eight candidates presented themselves. Questions were set to be answered in writing on the 3rd, and the candidates were examined *viva-voce* on the 4th. The Institute's certificate of competency as Local Surveyor was not awarded, but the Institute's certificate of competency as Inspectors of Nuisances was awarded to Joseph Horrocks, W. Sortwell, and J. W. Witts.

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap. 2d. tablets.—(Advt.)

ANIMAL VACCINATION.*

By C. CAMERON, M.D., LL.D., M.P.,
President of the Health Section of the Social Science Association.

[ABSTRACT.]

'ANIMAL VACCINATION' is briefly the practice of cultivating on calves lymph from cases of cow-pock occurring naturally in the cow, and the use for human vaccination of the calf lymph thus obtained. Natural cow-pock was so rare that had Jenner depended upon it, his discovery of its protective power could have come to nothing. Happily he discovered that cow-pock could be propagated upon human beings. Had the idea of propagating it on calves occurred to him it would have greatly facilitated his early labours, and have saved him from an accidental contamination of his lymph with small-pox, which nearly proved fatal to vaccination. His practice once established, Jenner had no occasion to change it, for he obtained wonderful results. As correctly summarised by the writer on vaccination in the *Encyclopedia Britannica*, in the epidemics of Rotterdam, Montpelier, and Edinburgh, occurring between 1818-23, and described by different contemporary authors, the mortality among a large number of vaccinated persons attacked was only about 1 in 330 cases. On the other hand, among the small-pox cases treated in the London hospitals during the epidemics of 1870 to 1879, three-fourths of the patients had been vaccinated, and of these about 1 in every 10 died.

In Jenner's day vaccination was conducted in what we should now consider a very inefficient manner, and yet the protection it conferred, as measured by the death-rate in cases of small-pox occurring in vaccinated persons, was ten times more efficient than that secured by the most complete form of vaccination practised at the present day, and twenty-five times greater than that afforded by our vaccination good and indifferent. As at present practised, vaccination still afforded a great protection against small-pox, but nothing comparable to that obtained in the early days of the practice. On the other hand, Dr. Cameron quoted from the experience of Belgium, Holland, and the United States, to show that the protection which animal vaccination afforded was even more complete than that recorded by early writers, and this he accounted for by the fact that those who practised it had adopted all the improvements which experience had engrafted on the system pursued by Jenner. He accounted for the falling off in our results by a deterioration of the vaccine virus cultivated for thousands of generations on what Chauveau's researches had proved to be an unnatural soil.

As illustrating this falling off, he exhibited a table giving an analysis of over 10,000 cases recorded in London in 1852-67, and over 4,000 recorded there in each of the periods 1871-78 and 1877-79. In cases exhibiting marks of cicatrices the mortality had in the first period been 7.6, in the second 8.15, and in the third 8.45. In cases classified as bearing good cicatrices the figures were respectively 1.8, 3.32, and 4.70; in the best class,—those recorded as showing four good cicatrices,—0.87, 1.5, and 3.33, and so on, the falling off manifested being most alarming in the best vaccinated class of cases, while the percentage classified as good in each successive period also showed a marked falling off. These facts, Dr. Cameron maintained, were themselves sufficient to call for a change in our system.

The motive which had originally given cultivation of lymph on calves was a desi all possibility of the inoculation of a human disease which had been frequently cated through the ordinary virus. Suc were in this country very rare, but the fac might occur, in the writer's opinion rend duty of the State which enforced vaccinat vide against all avoidable accidents. possible dangers which anti-vaccinators gested might attend on animal vaccin answer was that when it was practised, as i Holland, and the United States, no suc ever had occurred, and, assuming their th correct, the danger attendant on the ope no greater than that which lay in every c or mouthful of meat consumed. No da inflammation attended the use of the animal virus—in fact, there was much le from that than under the ordinary prac purposes of re-vaccination animal lymph a threefold advantage. It 'took' in a gr centage of cases; universal experience sh much larger numbers of persons got them vaccinated when it was available than wh not, and when required it could be produc limited quantities. This was not the c humanised lymph, which was always d obtain when the presence of an epidemic an abundant supply most urgent.

THE USE OF ALCOHOLIC STIMU IN THE IRISH WORKHOUSE

By E. MACDOWEL COSGRAVE, M.D. U

[ABSTRACT.]

THE question of how far alcoholic stimulan be used in our workhouses is an importan such stimulants are at present the cause direct and, it is to be feared, indirect exp During 1880, £11,845 8s. 7d. was spent on st in the Irish workhouses, forty per cent. of receiving them. The cost per head vari 9¾d. in Ulster to 3s. 3d. in Connaught. Dublin Unions it averaged 2s. 10d. pe Stimulants were given to attendants in 76 of our 163 unions. The amount of st consumed seems, on the whole, to be dec but in some unions it is increasing. In th Dublin Union the rate per head has fallen the last five years, from 2s. to 9½d., whils North Dublin Union it has risen from 1s 1s. 9d.

Stimulants cannot fairly be used in our w food, as their cost would be excessive, to say of the uncertainty of their utility. Thus, all the food elements contained in alcoh capable of being burnt, one imperial pint o ness's stout would only be equal, as food, to less than five ounces of sugar. Also, 3½d. w bread is equal, as a force producer, to 3s. 4½d of stout, estimated at its highest possible Alcohol is also too costly to be used as a food for the poor. Alcoholic drinks are probably t medicines, although they are not paid for as medicines are. But in the majority of cases diluted with water would be just as efficacio it would be cheaper, safer, and less attractive.

* Read at the Social Science Congress, Dublin, October 1881.

* Read at the Social Science Congress, Dublin, Octobe

s that would follow if the quantity of ed in our workhouses were materially ould probably be favourable. Insurance army and benefit club experiences show abstainer is, *cæteris paribus*, not only healthier than a drunkard, but also a better life than a moderate drinker. e of any Unions which have diminished f stimulants used tends to show that it n an increase of health. Many English this. In Ireland we have not yet got es to argue from, but those we have are se of stimulants. If the return of the mates, deaths, and costs of stimulants orkhouses be granted annually, we shall ficient ground for drawing more posi- ons. In the South Dublin Union the r the past five years were 67, 69, 54, 55, cost of stimulants per head was 2s., ., 1s. 1½d., 9½d. In the North Union ding figures were 65, 76, 72, 86, 67, and ., 2s. 1d. 2s. 5d., 1s. 9d.

proving health, the withdrawal of stimu- nprove the order, lessen the temptations to remain, discourage malingering, es, and do something to render those orkhouses less likely to return, and o change from rate-absorbers to rate-

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ON THE WORKING OF THE ISANS' AND LABOURERS' WELLINGS ACT, 1875.

By JOHN LIDDLE,
icer of Health, Whitechapel District, London.

e improvement of the Dwellings of the sses was, in 1875, introduced by Mr. hen Home Secretary, and which re- Artisans' and Labourers' Dwellings Act. present, has not been so productive of s anticipated, but the subject has lately n additional attention, not only from the n the Local Boards and the Metropolitan orks; and, moreover, has lately been r the notice of the House of Commons o a Select Committee who have taken eon. It may, therefore, be reasonably t considerable improvement in the e Act will be effected. The unhealthy ich exist in this vast metropolis are, sider its wealth, a great opprobrium, and calls for an effectual remedy which we ill soon be found.

Committee of the House of Commons be thoroughly in earnest in the matter, not confine their attention to the mere evidence of those capable of affording wledge of the subject, but they personally eral of the unhealthy areas which had ed to the Metropolitan Board of Works sideration and approval, previous to y the unhealthy houses from those n the 7th July, the Select Committee of f Commons visited the Rosemary Lane er and Dean Street areas in the White- ct.

be no doubt that the large buildings been erected on the sites previously ost filthy and unhealthy houses are an improvement; and if the class of persons who have been displaced by the pulling down of the filthy slums should occupy them, their health and physical well-being will be greatly benefited. The question, however, may be raised—Is the present plan, viz., the erection of large buildings capable of lodging numerous families under the same roof, the best for providing habitations for the working classes, and is it desirable that so many persons of the same class should live together in close proximity? It may be further asked, Is it desirable that facilities should be afforded for the crowding together in London of such a mass of people of the poorer class who seem desirous of living in the metropolis? The population of this city is already too large, and is increasing annually. In the census of 1871 the population of London was 3,254,260, and that of 1881 was 3,829,751, showing an increase in ten years of 575,491, and during the same period the density of the population has increased from 42 persons to an acre to 50.8. Unless more effectual means are adopted to prevent the building of houses so close together as is the custom at present, the health of the people will materially suffer. In my opinion, it would be in every respect much better if houses of a moderate size were built, capable of accommodating only three families in each, and so built that every house should have a certain open space exclusively belonging to it, where the water-closet, wash-house, and dust-bin should be placed. These conveniences should be detached from the house, but should be within the curtilage of the same, and should be used only by the tenants of each house.

As privies in courts, which are built only for the use of the tenants in the court, are, for the most part, open to the public, they are at all times a nuisance, and the further erection of them should be prohibited. Unless stringent provisions are made in a New Building Act to prevent the erection of houses in localities where there is not sufficient space for the health of the tenants, the same class of unwholesome dwellings will be built as those which have been recently demolished at great expense, under the provisions of the Act now under consideration; and the money which has been expended in clearing certain ill-ventilated sites will have been wasted; for after a time a similar process of demolition, as regards the newly constructed houses, will have to be repeated. At present, every piece of vacant ground large enough to erect a small house is speedily purchased and built upon without any efficient control; the Local Authorities having very little power to insist on proper provision being made for sanitary arrangements—in fact, houses can still be built back to back, there being no law in existence to prevent the creation of such a nuisance.

A Bill for the amendment of the existing faulty Building Act should be introduced by the Government, and the Government only could successfully carry such a Bill, which shall contain efficient sanitary clauses, through the Houses of Parliament. Owing to the formation of new streets, the clearance of several crowded sites, the increase of the population and the number of immigrants continually pouring into London, the suburbs are being built upon to a very great extent. It is therefore most desirable for the maintenance of the public health, that any new Building Act should apply, not only to the Metropolis, but to the entire country. I may here remark that the rents of the wretched houses which are now standing in some parts of the District of Whitechapel are very high; so much as 5s. per week

is demanded for three small rooms, and these rooms are usually sub-let at 2s. 6d. each. A single room is sometimes obtained for 2s. a week. Other houses, of a similar description, are let at 6s. per week, and the cost for two rooms varies from 4s. to 7s. 6d., while the rents of the rooms in the Peabody Buildings, in which the comfort and convenience of the tenants have been studied are infinitely better, and are not nearly so high.

It has generally been supposed that the greater number of the people living in the densely crowded courts are engaged at work in the vicinity of their dwellings, but on inquiry I find that it is not the case. Many work at the river side as wharf and dock labourers, and on the river as stevedores and coal-whippers. I was further informed that this class of persons, if they had to move further eastward would not be inconvenienced, as a number of them are employed in the East and West India Docks, and even as far as the Victoria Docks. The coal-whippers have to go to various places down the river, sometimes as far as Gravesend.

In my evidence recently given before the Select Committee of the House of Commons, on the subject of the working of the Artisans' Dwellings Act (1875), I stated that it would be much cheaper to many of the working classes, and infinitely better for their health, if they were to live in the suburbs, and ride either by rail or tram-car into London and back every working day. Not only by so doing would their health be improved, but their comfort would be greatly increased, and the additional expense which they would incur by riding into town would be recouped by the lower rent that would be incurred by lodging in the country. It appears from the table of fares published by the Great Eastern Railway, that third-class return tickets for workmen are issued daily on week-days to Liverpool Street at twopence each from all the intervening stations on the Great Eastern Line as far as Enfield. Third-class tickets, at the same price, are also issued to workmen from Stratford Market, Stratford, and Coborn Road; and this accommodation is, I am informed, greatly appreciated, daily tickets becoming more and more used as new houses for the working classes increase. The Peabody Trustees have printed certain rules which are to be observed by the tenants of their buildings, all of which rules, if strictly observed, will prove not only beneficial to them individually, but will add to the comfort of all the other residents. Although great advantages are offered by the Peabody Buildings, I do not find many of the poor people who have been displaced by the demolition of their houses, occupying these new Buildings.

It is most earnestly to be desired that the work of demolishing the filthy slums in London, which has been fairly commenced in this District, will be persevered in by the Metropolitan Board of Works, until the whole of these unhealthy localities are entirely swept away. It is truly a good work, and I am encouraged to expect from the following remarks, contained at page 38 of the last Annual Report of the Metropolitan Board, that the work will not cease until the entire demolition of the rookeries is accomplished. The report says, 'It is understood a full inquiry will shortly be made into the whole subject, and that the Board will avail itself of the opportunity to suggest in general terms the new legislation, which (so far as the metropolis is concerned), appears to be necessary to ensure the satisfactory operation of the Artisans' Dwellings Acts, and the attainment of the objects aimed at by the promoters.' The above remarks will give general satisfaction to all persons who have taken an active part in endeavouring to improve the moral and physical condition of the lower class of labourers. Let the slums be demolished without unnecessary delay; for unless the crowded and unhealthy localities be entirely demolished, any better class of dwellings which may be erected in proximity to them will not be attractive, and consequently will not be tenanted. The nuisances must first be cleared away, and then the work of building new and healthy houses may be advantageously carried on.

The Act passed in 1879 and known as 'Torrens' Amendment Act' provided, among other things, for the opening out by the Local Authorities of closed or partially closed, alleys or courts inhabited by the labouring classes, and the widening of the same by pulling down any building, or otherwise leaving such open spaces as may be necessary to make such alleys or courts healthful. The provisions of this Act, if carried out by the Metropolitan Board of Works, would prove very beneficial to the health of the crowded districts in the metropolis; but as the working of this Act is entrusted to the several Local Authorities, it is not likely that the Act will be applied to any great extent. If 'Torrens' Act' were to be incorporated with the Artisans' Dwellings Act (1875) and worked by the Metropolitan Board, such alterations in both these Acts being made as will lessen the expense to the ratepayers, London, in the course of a few years, would present a totally different aspect to what it does at present, and the rate of mortality would be greatly reduced.

It cannot be expected that the Local Boards will carry out the provisions of 'Torrens' Act' when the cost of doing so will fall entirely on the ratepayers of the district, perhaps a small and poor one, instead of the same being spread over the whole metropolis, as is the case under the provisions of the Artisans' Dwellings Act: and so long as 'Torrens' Act' is kept on the Statute Book unaltered, it will, to a great extent, be a 'dead letter'. It must strike every member of a Local Board how unjust such a proceeding would be, to charge its ratepayers with the necessary heavy expense for such improvements as would be for the benefit of the entire metropolis. It is well known that diseases which are generated in the crowded localities do not stop there, but travel to all parts of the metropolis; and persons living at a distance from the places which generate infectious diseases do not escape with impunity from the deadly effects of them. Moreover, it so happens that the poorest districts are those in which the greatest sanitary improvements are required, and it is just those which are the least able to defray the cost. As all London, therefore, is benefited by uprooting unhealthy localities, so all London should contribute in rateable proportion to the cost. All the powers of 'Torrens' Act' should be transferred to the Metropolitan Board of Works; and, in so doing, care must be taken not to allow compensation to be awarded for the condemned houses on the rent which is received from the tenants.

It is well known that the poor pay a much higher rent for their dwellings in proportion to their income, than is obtained from the upper and middle classes. Houses which were built for single families, and when so occupied were well suited for the healthy enjoyment of all the members of the family, are now let out in tenements, and are occupied by several families, for whom they are, in a sanitary point of view, totally unfitted for habitation, and it is just this

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THE

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OVEMBER 15, 1881.

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CITY AND SANITATION.

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fulness of this comparatively new power. It can be made to scrub floors, clean boots and knives, work lifts or sewing machines, cut wood, register the income and outgo of air and water, and a hundred things besides. In automatic ventilation electricity will also be of infinite service ; and it must be borne in mind that she is still in her adolescence.

It was a very happy idea, that of bringing to Sydenham as many as possible of the wonderful exhibits now housed in the Palais de l'Industrie at Paris, and it will tend to deepen the interest which all must feel in the wide application of the latest stranger. It is to be hoped that each of the sixteen classes will be shown by some of the hundreds of exhibitors now in Paris, and that all our readers will be able to cultivate an acquaintanceship with this, the latest candidate for the representation of our embodied interests. We forbear to say more at present, and will revert to the matter when the Exhibition is open.

SANITARY INSPECTION OF THE WHITE HOUSE, WASHINGTON, U.S.

WE have perused with great interest Colonel Waring's Report upon the plumbing work of the White House, the Executive Mansion of the President of the United States, and although it may be taken as an ordinary engineering report, and deals with no abstruse matters, it nevertheless gives us an idea of how a large Government residence is sanitarily equipped on the other side of the Atlantic. It appears that there, as here, bath wastes lead into soil-pipes, and the latter into sealed drains, which it is impossible to flush out properly. House sinks are also put into communication with underground traps of such huge dimensions as to fairly constitute themselves 'cesspools' in the worst sense of the word, and here decomposition goes on, the only escape of pressure being into the house itself. Then again, we read of pan-closets and urinals beside them, both situated in unventilated compartments, to say nothing of soil-pipes altogether unventilated. Speaking of soil-pipes moreover, they are occasionally much too large, six inches diameter when four inches diameter would suffice, and lavatories as well as sinks delivering into them direct, abandoned and unsoldered-up pipes being in the vicinity. Nor is this all, for one reads of cisterns standing practically in a water-closet apartment, with their waste or overflow pipes connected with the pipes down which tumble, cascade fashion or slow fashion, the mixed deliveries from sink, urinal, bath, and lavatory. And it was a merciful Providence that led the architect to sometimes cause the pluvial water to descend the same pipe, so as to scour it out intermittently.

We repeat that there is no new revelation of filthiness in the above description, and it is not a whit better than one could expect. Let us hope, however, that though we may 'always have the poor with us', we may not have reckless and ignorant plumbers everlastingly with us, sitting even in high

places and preaching evil repetitions, and the worst traditions possible, as truth. Matters do not look very sanguine as yet, we must admit, but we hope that the spread of technical education will, like the salute of the fairy in the fable upon the griffin's lips, soon dissipate the evils into thinnest air.

No one is more cognisant than is Colonel Waring of the defaults of English houses, and it is pleasant to find that in the advice he tenders to the Chief in charge of the Public Buildings and Grounds in Washington, he specifies exactly what our best engineers do here. Disconnection and separation of various wastes, and above all, ventilation, is the motto, and a worthy one in every respect.

We saw the other day in a residence in the Champs Elysées, Paris, a single closet taken into a nine-inch upright unventilated soil-pipe; but our friend can relate things even more ridiculous. Suffice it to say that he has shown the Authorities exactly what to do to render the residence entirely safe, and we trust that his dictum will be obeyed. When the inspection was made, the late lamented President lay in one of the chambers, and possibly some unwise thing or another was not laid bare; but there will, likely enough, be a supplementary inquisition.

THE DANGERS OF NEW WATER RESERVOIRS.

IT has before now been the subject of frequent complaint that in the preparation of large reservoirs for the storage of the water-supply of populous towns, incredible carelessness has been shown in leaving the bottom of such reservoirs uncleansed from the impurities which must inevitably gather upon it during the progress of the works. A very striking example of this kind comes to us from Bombay in connection with the provision of the new Tulsi water-supply for that city. During the hot season of 1879 the condition of this supply had been getting worse and worse; and in May it was such that in consequence of a representation from the military authorities the matter was brought to the special notice of the Government. The total capacity of the lake is 1,479,469,322 gallons, but of course the whole of this amount is not available for supply. On the 15th March 1879, the water was first turned on to Bombay, but hardly had it been received when it was universally and justly condemned. In speaking of the alarm it excited, the Health Officer, Dr. Weir, says that the water at first absolutely stank; it was of a dirty green colour, loaded with vegetable matter in globular masses in suspension, as well as held in solution in the water, and emitting a sickening dead-leaf odour. The alarm was not without good grounds; the albuminoid ammonia, the representative in this case of organic pollution of vegetable origin, reached the enormous limit of 0.75 parts per gallon.

In April special attention was drawn to the fearful state of the water from Tulsi, and it was a question whether public notifications should not be issued, pointing out the absolute necessity of allowing the water to settle, and of straining and filtering it. The vegetable impurities in the water were so great that ordinary filters would not act; they required to be cleaned so frequently that they were not serviceable. And, moreover, it was found difficult to preserve the ordinary carbon filter apparatus free from the sive dead-leaf smell of the water. On the 30t a sample collected from the surface of th yielded free ammonia 0.70, and albuminoid ar 0.61. A sample taken at the same time from t 40 and 50 feet below the surface of the lake, free ammonia, 0.25, and albuminoid, 0.40 pa million; the organic matter in the water w state of active decomposition, of which the en quantity of free ammoniacal compounds w product. The sample taken from the surface a light sherry colour; it had an enormous qua vegetable matter in suspension, and exhaled a musty odour. Other samples collected at d times up to the 19th June showed equally bad but between this latter date and the 2nd J water changed completely in character. A sar that date yielded free ammonia, 0.03, and albu ammonia, 0.17 parts per million. In Aug condition of the water again caused anxiet was of a milky colour, and on standing, a florescent deposit was formed. A sample ex from a main yielded free ammonia, 0.35, an minoid ammonia, 0.34 parts per million; it co 0.9 grains per gallon of chlorine, and the sol risen from the normal amount of between 6 grains per gallon to 16 grains per gallon. Th appearance of the water was, in the Health O opinion, due to finely divided sand, washed d large quantities from the hills around the Tul by the heavy rainfall. In October, samples 0.08 and 0.10 parts per million of albumin monia; the water was now well within the li wholesomeness, and caused no further anxiet the year.

The Medical Officer of Health ascribes t purity of the first supply to the decayin tation of a newly submerged area, and th mulated impurity attendant upon the work want of material sufficiently near, the whole lake had to be dug up to supply the earth for t and puddle trench, and there was very soon out a layer of the finest and foulest dust fro twelve inches deep; this, of course, was take the first filling. Moreover, there was an unf stoppage of the works for upwards of three discuss, at intervals, the ultimate form they take, and during that period the lower level large stagnant pond, in which vegetable or had unchecked development and growth. Bombay experiences teach a lesson that ough be lost sight of, especially in view of the fact is always difficult to convince people of the su of a new supply to that to which they ha accustomed by long usage.

ARTIZANS' DWELLINGS.

THE question of the proper housing of the our great cities, especially in the province of that we call London, is one that deserves and demands the earnest attention of all practical thropists. Legislation on the subject has been attempted in a more or less unskilful ar way; but it is abundantly evident that some once more comprehensive and more workal Sir R. Cross's Act of 1875 is required, though be admitted that the question of expense is important factor in the case. The Select Co of the House of Commons, appointed last Se consider the working of the Act of 1875, a amending Act of 1879, has as yet made on

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nong us.

London Union and the Local Government
osed on the question of the mode of pay-
ry of the vaccination officer for the union—
being in favour of payment by salary; the
ent Board desiring payment by results.

the Medical Officer of Health for the Urban
t of Harwich, the reports circulated as to
condition of the borough would appear to
He states that last year the general rate of
not exceed 17.6 per 1,000, and that the
to the present, during the current year,
16.8 per 1,000 living. The zymotic death-
rent year is given at 2.1 per 1,000, for the
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NOTES OF THE MONTH.

THE LEICESTER WATER-SUPPLY.

The Borough of Leicester seems to be at present in difficulties in connection with its water-supply. Last year several cases of typhoid fever were reported in houses supplied with water from surface-wells. Dr. William Johnston, the Medical Officer of Health for Leicester, published a report on analyses of the waters from certain surface-wells employed by some of his typhoid patients. He condemns these waters, as it seems to us very justly, as affording evidence of considerable contamination with nitrogenous organic matter. Dr. Henry Meadows, the Public Analyst for the Borough, published some 'observations' on Dr. Johnston's report, in which he dwells at some length upon certain remarks of Dr. Johnston's in connection with the influence of dissolved lime-salts upon the health of persons consuming them. The observations seem to be beside the point at issue, since the utmost evil attributed by Dr. Johnston to the presence of lime-salts in drinking-water is dyspepsia on the part of its consumers, and no one would think of attributing an outbreak of typhoid fever to such a cause. The real point of issue between Drs. Johnston and Meadows is 'What is the limit of safety as regards the amount of organic nitrogen permissible in a "potable water"?' It certainly seems to us that, as Dr. Johnston points out in his 'Reply' to the remarks of Dr. Meadows, the limit (if any) fixed by the latter gentleman is a very high one. Dr. Meadows' objection to the adoption of Wanklyn's standard does not seem to be made in the true spirit of scientific inquiry. He says, 'If this standard were accepted, the Leicester Waterworks water would have to be condemned.' Our answer is, 'Would such condemnation be a more dreadful alternative than the annual visitation of the Leicester community with typhoid fever!' Dr. Johnston gives evidence in his 'Reply' which is more conclusive in our eyes of the contamination by sewage of the 'surface-wells' in question even than the results of his analyses; evidence culled by careful inquiry and personal inspection of premises, which, taken in conjunction with the analyses, can leave little doubt in the mind of any competent judge that it would be a public boon to Leicester to close these sources of disease and death in such a way as to render further consumption of their contents impossible.

THE BRIGHTON HEALTH CONGRESS AND DOMESTIC AND SANITARY EXHIBITION.

The arrangements for this Congress, under the active management of the Mayor of Brighton (Alderman Hallett), are becoming extensive, and promise well. The exhibition will open on December 12th; and, on the 13th, Dr. B. W. Richardson will inaugurate the Congress with an address; Mr. Chadwick, C.B., will preside over Section A, 'Health of Towns'; Mr. Hollond, M.P., M.A., over Section B, 'Food in relation to National and Domestic Economy'; and Dr. Alfred Carpenter over Section C, 'Domestic Health and Educational Training'. On the 14th, a *soirée* will be given by the Mayor; and, on two other evenings, addresses will be delivered by Dr. Taafe and Mr. Brudenell Carter; the latter, 'On Eyesight', will be addressed specially to working men and women. The exhibition will include eight sections. 1. Food: its economic preparations and

use. There will be daily demonstrations of cookery, special exhibit of cheap preparations for the poor, and appliances for preparing all kinds of eatables. 2. Domestic and labour-saving appliances will include gas-stoves, washing and sewing machines, etc. 3 and 4. House-sanitation and industrial dwellings will deal with water-supply, ventilation and warming, drainage, disinfection, and hospital construction, with models of cottages and fittings. Upwards of forty of the best known makers of sanitary goods have already taken spaces; lectures will be given daily, and the diagrams of Mr. Teale's book will be shown as dissolving views. Hospital beds, with dressed lay figures, appliance and diet sheets, will also be shown. Demonstrations of analyses will be given, and 'insanitary dress' will be a feature. Section 5, on lighting, electrical, and kindred inventions, will be an important one, and some of the largest companies will exhibit in it. A temporary iron building, over two hundred feet in length, will be required for motors and engines. 6. Decorative art includes photography, china-painting, tapestry, furniture, etc.; 7 is devoted to horology; and 8 to a loan-collection, including much from South Kensington, and many choice modern paintings.

IMPROVED FIRE-GRATES.

Among the more interesting novelties which will be on view at the Smoke Abatement Exhibition, we understand that the joint invention of Messrs. Everitt and Barnard, consisting of a contrivance for preventing smoke from open fire-grates, is likely to be very attractive. The success which Messrs. Barnards have had with their 'slow combustion stove' entitles anything proceeding from the hands of one of their firm to a thorough examination; and no doubt the stall of Messrs. Barnard, Bishop, and Barnards at the above-mentioned exhibition, where this new invention will be on view, will be visited by many who are anxious to ascertain whether there is indeed some means of solving this hitherto unsolvable problem—the cure, or rather the abolition, of a smoky chimney. The exhibition will partially be opened on the 17th inst.

THE MALARIA OF THE ROMAN HILLS.

There is an article in the October number of the *Practitioner* which is of wider than medical importance, and deserves to be read by all who take interest not only in questions of public health but in Roman antiquities. At first sight the connection between the two subjects is not obvious; the link is that fatal and mysterious disease which is vaguely associated in our minds with the Campagna and the shores of the Mediterranean generally—malaria. Researches recently made in Italy to discover the true nature of this disease and the causes to which it is due have established certain primary conditions under which the germs—the *Bacilli malariæ*—are generated. These are (1) a temperature of about 20° centigrade; (2) a moderate degree of permanent humidity; and (3) the direct action of the air upon all parts of the mass. 'The absence of any one of these three conditions,' says Professor Tommasi-Crudeli, the writer of the able paper in question, 'is sufficient to arrest or render impossible the development and multiplication of this organism'. The bearing of these first principles, and their relation to previous ideas on the subject of the disease, are amply worked out and illustrated by the writer. It might seem that the second condition at once be put out of court by efficien and no doubt if the theory hitherto malaria is prevalent only in low marshy g true, this would be comparatively simple fessor Tommasi-Crudeli shows clearly 'paludine' theory is no longer tenable. conditions of the Roman Campagna app been misunderstood. It is commonly sup for the most part a plain, but as a fact i it are composed of hills rising gradually canic mountains of the Sabatine system o and of the Latian system on the south. enough, then, to drain the valley, for m prevalent on these hills as on the low Accordingly, if the three propositions st are true, there must be permanent humi subsoil of these hills. And it is so. We a from the lake basins formed by extinct cr Sabatine and Latian Mountains there is filtration into the subjacent districts of pagna, so that a subterranean sheet o formed and descends to the river valleys, of it finds an outlet, but far the greater pa permanently imprisoned beneath the soil, a one of the conditions for the generation of *malariæ*. Now comes in the antiquarian question. We know that malaria existe territory at a remote antiquity, but we kno these hills were occupied before the Roma by a numerous and prosperous population, wards became a pleasure ground, studded which were inhabited in summer durin centuries of the Empire. It is clear, the inhabitants must have found some mea pending or modifying during this long ser the development and multiplication of mala not only in the soil of the valleys, but a much more extended ground of the Ro The solution of this problem has come read For some time past small tunnels of abou in height by two feet broad have been notice through the hills, of which the principal ma canic tufa. Hitherto, these have been reg conduits for drinking-water. It is now ce they form part of a vast system of drainag removal of the water from the hills. After a account of their construction, Professor T Crudeli proceeds to consider their probable the possible explanations of the silence of authorities. He gives grounds for the belief system was known and applied before Rom The only admissible explanation, in his o the silence of Roman writers on agricultur the works were so universally known, that it worth while to refer to them. This is easier to understand than their entire ign the existence of such a network beneath t feet. It does not seem certain from pres whether this drainage system was first begu poses of hygiene or of agriculture. But ev latter end only were in view, the continual of water from the hills must have gradually di the dampness of the soil which covers them have restricted the production of malaria. case, the discovery of a connection betw tunnels and the prevention of malaria is of importance, not only archæologically, as a the unrivalled practical genius, if not of the then—more interesting still—of their predec the country, but also from a sanitary point as a voice from the past, showing that what

.se in ancient days may with our ›ds be used with still greater effect at :.

PUBLIC HEALTH

JRING OCTOBER 1881.

:rature of the air during October at the y, Greenwich, was 45°.3, and 4°.3 below ›ber temperature air 100 years. Last :r than any October in the past thirty approach to it occurring last year, when .2. The mean was below the average on ıonth, except the 11th, when it was 55°.4, e average. The coldest day was the 31st, as only 33°.2, and showed a deficiency of neasured at Greenwich on thirteen of the ys of the month to the aggregate amount ıich was very slightly below the average ı sixty-one years. The rainfall at Green- en months of this year amounted to 20.4 ather more than half an inch below the or that period. The sun was above the 8.7 hours in October, and 96.6 hours of ere recorded at Greenwich; this was 16.4 the average amount of bright sunshine in months of the four years 1877-80. North- evailed during the greater part of the : week ending the 15th, during which the from the west.

ıe largest English towns, dealt with in ıeral's weekly return, 21,119 births and e registered during the four weeks ending births exceeded by 1432, whereas the elow, the numbers in the corresponding o. The births were equal to an annual ıooo of the aggregate population of the .inst 34.2 in the corresponding period of rease prevailed generally in all the towns. ates in these towns last month were 32.3 ton and Bradford; the rates in the other ards to 38.9 and 43.1 in Leicester and London the rate was equal to 35.6, ed 36.8 in the nineteen provincial towns. ath-rate in the twenty towns during the ober averaged 20.6 per 1000 of their esti- , against 21.1, 20.6, and 22.1 in the three riods of 1878-9-80. The unseasonably ng the greater part of October caused a ease in the fatality of diseases of the s, and the death-rate showed a marked exceptionally low-rate in September. It low the average rate for the month. The ortality during last month was 15.8 in rates in the other towns, ranged in order were as follow: Bristol, 15.9; Norwich, 9; Sheffield, 18.1; Birmingham, 18.8; ; Leicester, 19.1; Bradford, 19 4; Sun- ghton, 20.1; London, 20.4; Nottingham, pton, 21.0; Oldham, 21.2; Salford, 21.5; ; Manchester, 21.9; Liverpool, 26.7; ıest rate, 27.9, in Hull. The death-rate ıal to 20.4 in London, and averaged 20.8 ovincial towns, which have an estimated ion very little less than that of London. es in Liverpool and Hull were in great cessive zymotic fatality.

.ths from all causes in the twenty towns eeks of October included 600 from scarlet 'fever' (principally enteric), 313 from ım measles, 224 from whooping cough, ria, and 77 from small-pox. Thus 1910, ent. of the deaths from all causes were ıcipal zymotic diseases; these were equal : of 3.3 per 1000 in the twenty towns, increase upon the rate that prevailed in the preceding month. Scarlet fever, measles, and 'fever' were considerably more fatal in October than in the previous month. The zymotic death-rate last month was equal to 3.1 in London, and averaged 3.4 in the nineteen towns, among which it ranged from 0.5 and 1.2 in Plymouth and Norwich, to 4 4 in Nottingham, 5.9 in Liverpool, and 12.3 in Hull. The excess in the zymotic death-rate was due to scarlet fever in Nottingham and Hull, and mainly to measles in Liverpool. Scarlet fever was again the most fatal zymotic disease in the twenty towns during October, and the annual death-rate from this disease, which had steadily increased from 0.42 to 0.84 in the four preceding months, further rose to 1.03 in October; this rate, however, was almost identical with that which prevailed in the corresponding month of last year. The mean death-rate from this disease was considerably higher in the nineteen provincial towns than in London; the highest rates in the nineteen towns were 2.2 in Brighton, 2.7 in Sunderland, 3.1 in Nottingham, and 11.1 in Hull. The scarlet fever epidemic in Hull showed a further increased fatality, the death-rate from this disease, which was equal to 1.0 per 1000 in May, has since steadily increased, and was, as before stated, 11.1 in October.

The fatal cases of diarrhœa in the twenty towns showed a further marked decline from those returned in recent months, and were equal to an annual rate which did not exceed 0.54 per 1000, against 1.37 in the corresponding month of last year. Fever (principally enteric) caused 316 deaths in the twenty towns, of which no fewer than 208 occurred in London, while 108 were returned in the nineteen provincial towns; the annual death-rate from this disease, which was equal to 0.20, 0.27, and 0.44 in the three preceding months, further rose to 0.54 in October. Enteric fever is usually most fatal in the autumn, but the rate last month, especially in London, considerably exceeded the average. The highest death-rates from fever during last month occurred in Brighton, Oldham, and London. The excessive death-rate from fever in London was partly due to outbreaks of typhus in Marylebone and Whitechapel. The fatality of measles also showed an increase, and caused an annual rate of 0.44 in the twenty towns, against 0.51 and 0.28 in August and September; this disease showed the largest proportional fatality in Liverpool. The 224 deaths from whooping-cough were equal to an annual rate of 0.38 per 1,000, showing a further decline from the rates in recent months; the greatest fatality of this disease occurred in Salford. The 123 deaths referred to diphtheria very considerably exceeded the average number for the month, and were equal to an annual rate of 0 21, against 0.12 in each of the preceding months; 71 occurred in London, and 52 in the nineteen provincial towns, which included 24 in Portsmouth, 10 in Birmingham, and 9 in Liverpool. The epidemic of diphtheria in Portsmouth showed increased fatality during October, and no fewer than 132 deaths from this disease were recorded within the borough during the first ten months of this year. The deaths from small-pox in the twenty towns were 77 during the four weeks of October, and the annual death-rate from this disease, which had steadily declined from 0.61 in May to 0 17 in September, further fell to 0.13 last month. Of the 77 fatal cases last month, 73 were recorded in London, whereas but 4 occurred in the nineteen provincial towns, including 2 in Salford, 1 in Oldham, and 1 in Newcastle-upon-Tyne. Judged by the returns of the Metropolitan Asylum Hospitals, the prevalence of small-pox in London appears to have been stationary during October. The number of small-pox patients under treatment in these hospitals, which had steadily declined in the four preceding months from 1,552 to 454, were 453 at the end of October; of the latter number 152 were under treatment in the *Atlas* hospital ship, and 56 in the Convalescent Hospital at Darenth. The average weekly number of new cases of small-pox admitted into these hospitals, which had declined from 317 in June to 82 in September, further fell to 73 in October. The largest proportional fatality of small-pox in the metropolis during October was again recorded in the east and south groups of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year of age to births, averaged 136 per 1,000 in the twenty towns last month, against 200 and 125 in August and September; it did not exceed 125 in London, while it averaged 146 in the nineteen provincial towns. This proportion ranged in the several towns from 79 in Plymouth and 109 both in Brighton and Hull, to 183 in Liverpool and Salford, and 193 in Wolverhampton. The rate of infant mortality in Wolverhampton has shown a marked and constant excess in recent months.

The fatality of diseases of the respiratory organs, judged by the figures for the metropolis, showed a marked increase during October. The average weekly number of deaths referred to these diseases in London, which had not exceeded 144 and 159 in August and September, rose to 300 in October; they exceeded the average weekly number in the corresponding month of the last ten years by 15. The annual death-rate from these diseases in London, which was but 2.0 and 2.2 in August and September, rose to 4.1 last month. The death-rate from the same diseases during the month was equal to 6.2 in Liverpool and 4.1 in Salford.

During the four weeks of October the causes of 284 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner. These uncertified deaths were equal to 2.4 per cent. of the total deaths registered. The proportion of uncertified deaths did not exceed 1.3 in London, whereas it averaged 3.5 per cent. in the nineteen provincial towns; the percentage in these nineteen towns ranged from 1.0 in Birmingham and 1.1 in Portsmouth and Plymouth, to 6.6 in Wolverhampton, 7.8 in Salford, and 8.2 in Oldham.

Among the population of little less than a million persons living in the outer ring of suburban districts around London, the annual death-rate from all causes during October did not exceed 14.5 per 1,000, against 17.4 and 13.2 in the two previous months. The annual death-rate from the principal zymotic diseases, which had fallen to 1.8 per 1,000 in September, was equal to 2.1 in October. The fatal cases of small-pox in the outer ring, which had been but 5 in September, rose to 8 in October, of which 4 occurred in West Ham and 2 in Edmonton subdistricts. The deaths referred to scarlet fever and enteric fever showed a considerable increase during October, in the metropolitan suburbs as well as inner London.

SPECIAL REPORTS.

THE SANITARY CONGRESS IN VIENNA.

THE German Society of Public Health held its ninth meeting, in conjunction with the Society for Technical Hygiene, in Vienna, on September 14, 15, 16, and 17, under the presidency of Duke Charles Theodor of Bavaria. The following subjects were discussed.

The Hygienic Requirements as to Position and Use of Cemeteries.—Professor Hofmann (Leipzig) opened a discussion on this subject in a long address. He said that the sanitary disadvantages attributed to the laying out of cemeteries were, in the great majority of cases, destitute of any scientific evidence or foundation. Real danger to health arising from cemeteries was to be expected only from injudicious choice of soil and defective management. Drs. Witlacil, Karajan, Rózsahegyi, and Kuby, took part in the discussion.

The Use and Abuse of Alcohol.—Professor Binz (Bonn) opened a discussion on this subject with a paper, in which he stated that alcohol, in any form whatever, was to be recommended only in abnormal conditions, as a means of economising material in the human body. Many alcoholic drinks contained adventitious products of fermentation or distillation, which acted even more injuriously than ethylic alcohol. As the withdrawal of the latter from pop lar use was not to be expected, it became necessa to have a more correct scientific knowledge of t hurtful adventitious products, to discover the mea of removing them from alcohol beverages, and prevent the traffic in impure alcohol. — Dr. B (Berlin) read a paper on the same subject. The f lowing were the propositions laid down. 1. T abuse of alcoholic, and especially of distill beverages, is the cause of grievous damage both individuals and to society. 2. Used habitually a in excess, alcohol interferes with the course of t normal changes in the organs, and produces chang in the body, which lead to disease and prematu death. In a similar way, it destroys the intellectu and moral faculties of man, and makes him incapab of fulfilling the higher duties to his family and to t state. 3. Drunkenness injures the social organism b causing bodily, moral, and intellectual degeneratic of a portion of the population, not only in the prese but also in future generations; by increasing i dividual as well as general poverty, by favouring, t a very considerable extent, insanity and suicide, an by increasing crime and immorality. 4. All organ of political life and all rightly thinking members o society are called on, both individually and collec tively, to combat this evil; and especially is it the duty of the public and private guardians of health to co-operate in arresting, as far as possible, the source of so much human misery, disease, and death. 5. The State can combat drunkenness, directly and indirectly, by the following measures: *directly*, (*a*) by causing an increase of price of the concentrated intoxicating liquors commonly used, such as brandy, by taxing them as highly as possible; (*b*) by suppressing the so-called home-distilleries; (*c*) by reducing the number of beer-houses and retail spirit-shops; (*d*) by granting licenses only to those persons whose previous life and conduct gives assurance that they will not favour drunkenness from base motives of self-interest; (*e*) by punishing the keeper of a beer-house who supplies intoxicating liquors to drunken persons, or to persons evidently under age when unaccompanied; (*f*) by annulling drinking scores; (*g*) by limiting the time of sale; (*h*) by watching over the quality of the drinks offered for sale in the licensed houses; (*i*) by punishing public drunkenness; (*k*) by erecting institutions for the penal detention of persons who, in consequence of the abuse of intoxicating liquors, neglect their duties towards themselves and those dependent on them, and become dangerous to themselves and others; *indirectly*, (*l*) by raising the moral tone and extending knowledge and education among all classes of society; (*m*) by increasing the prosperity of the population; (*n*) by providing good and cheap articles of food for the poorer classes; (*o*) by providing a sufficient and cheap substitute for spirituous drinks, by reducing the taxes on light beer, coffee, and tea; (*p*) by promoting temperance among the people, especially by instructing the youth regarding the nature and effects of intoxicating liquors; (*q*) by punishing drunkenness and drink-craving (*Trunkenheit* and *Trunksucht*) in the army and among all classes of persons holding official positions. 6. Society may aid in combating the desire for drink; (*a*) by individual temperance, and its promotion in families; (*b*) by the formation of societies having as their chief object the aid of the cause of temperance by appropriate means; (*c*) by erecting coffee and tea-houses, concert-halls, and reading rooms, in which, without the use of intoxicating liquors, the poorer classes

to enjoy social intercourse and find in-
entertainment; (*d*) by the erection of
private aid, into which dipsomaniacs
lerate means may voluntarily enter for
of being cured.

tination of Flour.—In a report on this
Professors J. Nowak and A. Vogl of
following propositions were laid down.
t advances in the art of grinding have
essentially to the improvement of the
ır, and have rendered possible the sup-
quantity of white flour. 2. One of the
arrived at has been to nearly com-
e worthless or injurious impurities from
effect as completely as possible the
ıe cortical portions from the interior of
. With regard to this condition of the
ınitary interest demands that the flour
should be as free as possible from bran,
ıse that it should contain only the con-
he fruit of grain. Foreign substances
be found in it. 4. In flour as met
nerce, numerous foreign adulterations,
quality, and even injurious to health,
found. Of mineral substances, plaster-
and chalk, as well as alum, sulphate of
ulphate of zinc, and of vegetable mater-
l of tares or of cheaper kinds of grain,
udulently for the purpose of increasing
5. Of the adulterating articles, some,
um, chalk, alum, etc., impair the nutri-
of the meal and diminish the digest-
ıe bread; others exercise an in-
nce on the taste and colour of bread
pability of the flour for baking; while
as the seeds of *agrostemma githago*,
rch, produce poisonous effects and are
ıealth. 6. Considering the great im-
these adulterations, which not unfre-
ıet with, it is to be regretted that the
s and ordinances regarding the sale of
ıd are incomplete, and the penal enact-
t adulteration are wanting in pressure.
rest of the public welfare, a systematic
laws and ordinances, of the trade in
ıd is demanded in the German empire
European states. 8. While the sanitary
ıtly watch and control the trade in
d, there is pressing necessity for public
ır the technical examination of such

ng subjects were also discussed:—
gases as means of Spreading Epidemic
eporters: Dr. J. Soyka (Munich) and
ózsahegyi (Buda-Pesth).
vantages and Disadvantages of Heated
ers: Professors H. Fischer (Hanover)
dor (Buda-Pesth).

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ire Hospital at Buxton, which has been
enlargement, has been opened by the
hire. This additional accommodation has
hrough a grant of £24,000 from the Con-
of the Lancashire Cotton Districts. The
ere such that the charity was not entirely
ıy time the work of extension was in pro-

who is at present a prisoner in Kilmainham
removed by the Local Government Board
one of the medical officers of the work-
ll prevent his future election to any poor-
ointment in Ireland.

THE INFLUENCE OF SEWAGE GASES ON THE PROPAGATION OF TYPHOID FEVER.

AT a recent meeting of the Glasgow Medico-Chirurgical Society, Professor Geo. Buchanan, President, in the chair, Dr. Eben. Duncan read some observations on Sewage Gases and their alleged Influence on the Propagation of Typhoid Fever. After referring to the origination of the sewer gas theory of the propagation of typhoid fever by Dr. Murchison in 1858, in order to show how universally this theory is believed in by sanitarians at the present time, Dr. Duncan read some extracts from the writings of Dr. Budd, Sir Thomas Watson, and others, by whom it was taught that sewage gases and the germs arising from decomposing typhoid excreta, carried back by sewage gases, were the most common cause of typhoid fever in our sewered towns and villages, and that the smallest crack or perforation in a soil pipe, by which sewer air could enter a house, was held to be a sufficient cause of any outbreak of typhoid fever which might happen in that house.

Dr. Duncan's first objection to the theory was that, as sporadic cases of typhoid were constantly occurring in sewered towns and villages, and as defects of soil pipes and house drains permitting the entrance of sewer air into dwellings were extremely common, if, with that sewer air, swarms of disease particles were really being carried, the amount of typhoid fever in sewered towns would not (as proved by statistics) be less in these towns than in country districts which have no sewers. Dr. Russell had proved that in Glasgow the greatest amount of typhoid fever was found in houses that had no water-closets. Another objection is that it is now established that neither in evaporating nor in gaseous emanation from decomposing organic fluids do the vapours carry with them the germs of bacteria, and, if so, they cannot carry the germs of zymotic diseases like typhoid, which are now believed to arise from living germs. If, therefore, such germs are carried back by sewer gases at all, it must be in such dust particles as may otherwise become suspended in sewer air. In a sewer which is constantly being deluged with water, the chances of typhoid excreta being dried up on its sides, and so formed into dust particles, are very small. But Dr. Duncan believes that the most conclusive proof of the erroneous nature of the sewer gas theory is to be found in the records of the milk epidemics which are now so common in sewered towns. In these epidemics we have an opportunity of observing how masses of decomposing typhoid excreta, produced by patients poisoned by tainted milk, may flow in our sewers and yet fail to communicate the disease to large populations draining into the same sewers, and proven to be in direct communication with these sewers and their air currents through great and manifold imperfections of house drains and soil pipes.

He then gave in detail the results of an inquiry into the state of the soil pipes, house drains, and sewers of Crosshill and its neighbourhood, at the time of the epidemic of 1875, which had been traced by him to a milk supply contaminated with typhoid excreta. He showed that large numbers of persons in adjoining localities having a pure milk supply were exposed, by proven defects of soil pipes, house drains, and sewers, to emanations from Crosshill sewers, in which, for months, masses of decomposing typhoid excreta were flowing; and yet it did not appear that a single case of typhoid resulted among the inhabitants of these houses, who certainly breathed these effluvia.

He then mentioned more particularly the circumstances of several affected tenements of houses in Crosshill, in some of which there were no traps on the house drains, and so they were in direct communication with the sewer; in others, the discharges of the fever patients were arrested in large square traps, in which the excreta floated for weeks, and the gaseous emanations from these decomposing masses were afforded facilities for admission to the houses by defects of plumber work in the soil pipes, and by bell traps in the basement flats; and yet it was found, after careful inquiry, that in these houses no family, the members of which did not partake of the poisoned milk, was affected by the fever.

Dr. Duncan then referred to two Glasgow epidemics,

proven to have arisen from tainted milk, which had been carefully investigated and reported upon by Dr. Russell—the Washington Street outbreak of 1875 and the Hillhead epidemic of 1878.

In Glasgow, defects of sewerage were so common, that Mr. Buchan, the well known plumber, had stated that out of 200 houses in the west end of Glasgow, which he had examined by the smoke test, there was only one in which the smoke did not get access to the house through some crack or crevice in the soil pipe, and that in 10 per cent. of these houses there was no trap upon the house drain, so that there was a free communication between the house and the sewer. Yet, although large quantities of typhoid excreta were flowing in the Glasgow sewers during those epidemics, there was no proven extension of the disease along the lines of drainage. Large populations were exposed to the emanations from these sewers with perfect immunity from any evil result in the production of typhoid fever. From these and other facts Dr. Duncan argues that the propagation of this disease by sewage gases is a rare occurrence; but that it may happen occasionally in consequence of the rise and fall of sewage leaving the sides of the sewer alternately wet and dry. Typhoid excreta in this way getting dried upon its sides, may be carried back in the form of dust. It therefore comes to be a serious question whether we may not err in making an unnecessarily large number of openings in our sewers and house drains. By so doing, we may dry up a large amount of the dangerous material, and promote its dissemination in dust particles. Dr. Duncan concluded by giving statistics showing that free ventilation of sewers does not diminish the amount of typhoid fever in proportion to the population in our large cities.

	Average Rate per 1,000.
1. Bristol, with no ventilation of house drains or sewers	.38
2. Plymouth, one ventilator on every five miles of sewer, and no house drain ventilation	.36
3. London, where the sewers are ventilated, but the house drains are for the most part unventilated	.26
4. Croydon, where both public sewers and house drains are ventilated	.59
5. Glasgow, sewers well ventilated, house drains, for the most part, ventilated	.37
6. Dublin, where there are comparatively few water-closets	.5

Dr. GAIRDNER said that Dr. Duncan had certainly made out an extremely strong case in favour of the views which he held. Whether or not he has proved to demonstration the innocuousness of sewer gas, as far as the production of typhoid fever was concerned, he has at all events given strong reason to doubt the received opinions on the subject. They would remember a correspondence in the *Times* newspaper at the time of the illness of the Prince of Wales, in which expert after expert had laid it down as an inexpugnable fact that that illness was due to sewer gas. In his then position of sanitary officer for Glasgow, that correspondence had greatly impressed him, and he was bound to allow his public action to be influenced by it. He accordingly wrote a memorandum, which had a rather remarkable history. But even then he could not conceal from his mind the fallacy which Dr. Duncan had that evening exposed: Given a case of typhoid fever, and set a skilful man to work to examine the water-supply and the sewer arrangements, there was certainly no house in existence in which some flaw could not be detected to which the fever could be ascribed. Lately he had himself removed into a house, one of thirteen built at the same time. He had to occupy it suddenly, with the knowledge that his predecessor—a gentleman minutely acquainted with the details of building, and peculiarly careful in everything relating to health and comfort—had not latterly enjoyed very good health in the house, and had recovered his health since removing from it. The very first night he entered the house he was struck with the feeling of a something pervading the place that should not have been there. But he resolved not to say anything till somebody else made the same observation. The result was the discovery that the whole of these thirteen houses, built by a first-class contractor, and under the supervision of one of the highest architects, were pervaded with sewer gas. The practical view he took was, that sewer gas, whether or not it gave rise to fever, was a most objectionable thing in itself, and a thing to be got rid of; and to that conclusion he still adhered. The theory of the production of typhoid fever by sewer gas was founded on certain facts which hardly justified the theory, but to which it would be difficult to deny a certain validity as pointing in the direction of the theory. He would have liked had Dr. Duncan entered on a critical examination of these facts, as given in the reports of the epidemic of typhoid fever in Windsor; how the fever was found to be coincident in locality with the line of a particular drain, and to such an extent that one side of the street escaped while the other suffered; how the Castle escaped fever, its drains communicating with the non-infected drain. These facts at the time appeared to present an extraordinary case for the sewer gas production of the fever; and even yet they were well worthy of careful consideration in forming a judgment on the question.

Mr. JOHN REID was glad that Dr. Duncan had given his adhesion to the view that sewer gas had no power to produce so-called typhoid fever. Sewer gas might probably enough give rise to a bad state of health, but certainly not to typhoid fever; which in his opinion did not arise from the respiration or imbibition of anything in any manner. When there were few water-closets in Glasgow, perhaps not above 150 altogether, typhoid fever prevailed to a great extent. At that time a great part of the drainage was surface drainage. This shows that the fever did not arise from confined sewer gas emanating from pipes or gratings. Mr. Reid gave a number of observations made by him when in country practice in Fifeshire confirmatory of his opinions. In the rural villages the epidemic appeared and disappeared, without anything to account for the facts in the sanitary state of the villages. He had known a curious case in which three members of one family, living in different parts of the country, and without any intercourse with each other, were laid down with the fever at the same time.

Dr. ROBERT PERRY said that he had always seen difficulties in the way of the reception of the sewer gas production of typhoid fever, unless in exceptional cases in which the gas carried solid particles, which might be taken into the alimentary tract. Bad health, or possibly diphtheria, might, however, be the result of sewer gas. It would be a pity if an impression were to arise that sewer gas was a thing quite innocuous. But that it could not give rise to typhoid fever had been impressed on him by one very extraordinary case. A number of years ago the Royal Infirmary acquired a large part of the ground below the Fever House. On this was a house, near the Molendinar Burn, which had for long been an inhabited dwelling, many people occupying it. Underneath this house the drain from the fever hospital ran; and the flagstones of the floor were so separated by crevices that the sewer gas with which the drain was charged must have found unimpeded access to the house. For all this, it was established by inquiry that the house had been quite free from fever.

Dr. DUNCAN, in reply, said that he was far from saying that sewer gas was innocuous. He had no doubt that it gave rise to organic degenerations of various kinds; he simply contended that it did not produce typhoid fever. The striking case which Dr. Parry had mentioned seemed almost a gigantic experiment framed for the very purpose of demonstrating the thesis he had contended for. No case of typhoid fever had ever been demonstrably connected with gas from a sewer. In regard to former epidemics, it was noteworthy that the first epidemics at Croydon had been attributed to sewer gas, but were now known to be due to tainted water-supply. The circumstances of the Windsor outbreak were not fully known; the gentleman sent down to investigate the facts was strongly impressed with the sewer gas theory, and, having gone with a preconceived opinion, found what he expected to find.

The Southend Local Board have decided to prosecute the parents in a case of scarlet fever where, notwithstanding remonstrance, the patient was moved in a cab to the railway station, and thence conveyed by train to London.

ASSOCIATION OF MEDICAL FICERS OF HEALTH.

meeting was held on October 14th; Mr. f York, the President of the Association,

the Committee for the past year referred number of members. Four meetings of had been held during the year, at which read and interesting discussions had taken these was a combined meeting of the es, the North-Western, and the Yorkshire in York in April last. The subject then hat of infant mortality due to diarrhœa. Parsons, Medical Inspectors of the Local rd, were present, and took part in the

were elected Officers for the ensuing year, S. W. North, M.R.C.S., York. *Vice-*Scott, M.D., Ilkley; H. Butterworth, *nittee:* S. Drew, M.D., D.Sc., Chapel-J. Farquhar, M.D., Pudsey; E. B. Hicks, Hardwicke, M.D., Rotherham; R. B. nsley; T. Britton, M.D., Halifax; T. W. effield; W. Sykes, M.R.C.S., Mexboro'. *easurer:* J. Mitchell Wilson, M.B., Don-

was directed, in the name of the Associa-to request the President of the Local rd to allow the printed reports of the rs of the Board, in so far as they relate to ase, to be purchased in the same way as pers. The Association, strongly impressed these reports, desires to use them in the blic and that service, which they would is effective and helpful to the public weal wer.

T thanked the members of the Association him President, and congratulated them le results which had followed upon the blic Health Acts, particularly the lessened ymotic diseases, due, in no small degree, the Medical Officers of Health.

Influence of Drinking-Water in Originating ever were read by Mr. W. SYKES (Mex-MITCHELL WILSON (Doncaster). Mr. dverted to the fact that many people are habit of drinking water largely polluted r, and yet do not suffer from typhoid fever. he thought, may be due to one of two at the fæcal matter does not contain the enteric fever, or that the persons using the cted by previous attacks of that disease. nce of several cases in his practice, Mr. ly in favour of the specific origin of typhoid ved, with Liebermiester, that the decom-ic substances is not of itself sufficient to ase. Dr. Wilson gave the details of an oid fever he had recently investigated, due ions having reached the common water-eculiarity of the outbreak was, that the tained from a well or cistern, but from an tapped the water from the sandstone-rock, strict, is found very near the surface. The nt was known to have been thrown into a ed yards from the outlet of the water; but rock were traced from that point in the l close to, the privy in question. A dis-the reading of the papers.

ds (*Journal de Pharmacie et de Chimie*, that the difference of specific gravity , on the one hand, and margarine, oleo-mixture of margarine and oil of earth-nuts s very limited, and that consequently no upon specific gravity is capable of showing portion of fats and butter found in com-

SMOKE ABATEMENT.

THE final arrangements for the forthcoming exhibition at South Kensington of smoke-consuming apparatus and various kinds of fuel are being rapidly completed, and it is intended that the exhibition shall, if possible, be opened by the end of this month.

It was stated by Mr. Ernest Hart (Chairman of the Joint Committee) at a recent meeting, that the Committee of Experts had succeeded in obtaining the services of Mr. D. K. Clark, M.Inst.C.E., an engineer of a high class, who would be generally approved. He was well known, and would, he thought, carry with him the approval of all classes of exhibitors. Professor Chandler Roberts, F.R.S., reported that the details and conditions of the chemical testings were finally settled. Mr. James Richards, of the Royal Albert Hall, has been appointed successor to Mr. Redgrave, who, in consequence of a Government appointment, had been prevented from continuing his services.

It was stated by the Hon. Sec. that applications for space had been received very numerously from the leading houses among manufacturers of improved domestic fire-grates and heating apparatus, as well as from manufacturers of novelties for the prevention of smoke, and of smoke-consuming apparatus of various kinds. It was also stated that several interesting exhibits had arrived from America. Gas producers and gas engines would also be shown.

It was stated that arrangements were being made for the delivery during the Exhibition of lectures and demonstrations explanatory of exhibits.

It was proposed to introduce into the Refreshment Department provisions cooked by the improved appliances, and it was stated that the School of Cookery, South Kensington, would assist in organising this department.

The Hon. Sec. reported that the Gas Light and Coke Company, in response to his application, had offered to give gratuitously the gas required for all purposes of the Exhibition, and a vote of thanks was accorded them.

The Chairman reported, in the matter of prizes, that Dr. Siemens had offered a prize of 100 guineas, to be given 'for the best method or arrangement for utilising fuel as a heating agent for domestic and industrial purposes, combining the utmost economy with freedom from smoke and noxious vapours'; also, that the following sums had been received towards the 'Ladies' Prizes', which would be of the value of 100 guineas, divided into two sets of prizes for kitcheners and open grates respectively: Mrs. Rathbone, 10 guineas; Lady Burdett-Coutts, 10 guineas; Lady Frederick Pollock, 2 guineas.

A letter was read from Mr. J. E. Blaine, the American Minister at Washington, expressing the great interest which the manufacturing cities of that country felt in this subject, and stating that that Government would therefore make special efforts to give publicity to the objects of the exhibition in question, as well as adopt any measures which might be found practicable for contributing to its interest and success.

A communication was read from Mr. Wood, the Secretary of the Society of Arts, stating that this Society had decided to place a medal at the disposal of the Committee, to be awarded in the name of that Society, and they had nominated Lord Alfred Churchill (President of the Society) to act on the Committee of Judges; also, that it had been proposed by Captain Galton that the Society of Arts should aid this Committee in the lectures to be delivered at South Kensington.

The Hon. Treasurer reported a satisfactory state of the finance, and further subscriptions towards 'The Ladies' Prizes'.

At the Bradford Police Court a householder has been fined 10s. 6d. with costs for failing to give information to the Medical Officer of Health for the borough, of scarlet fever in his house, in accordance with the provisions of a local Act.

A lodging-house keeper has been fined £5 and costs by the Liverpool magistrates for reletting a house, where there had been a case of scarlatina, without its being disinfected.

THE FOOD EXHIBITION AT THE AGRICULTURAL HALL.

(From a Special Reporter).

If our authorities do not feel themselves called upon to take any steps towards bringing together a display of food products from various parts of the world, upon which we appear to be each year more dependent for our daily sustenance, private enterprise has come forward to supply the want. Mr. Black, whose name has become so associated with exhibitions at this popular building, last year added to his many laurels, by inaugurating a food exhibition, which, like most of his ventures of a similar character, proved successful. Knowing well that no new feature connected with displays in one particular field of operations is sufficient to develop its usefulness, he has this year repeated the experiment, and judging from the appearance of the collection and the numbers who have visited it, there is no doubt that it will enter the category of the annual exhibitions that different classes now look forward to as the various seasons come round. There is certainly none of these displays that appeals so directly to the community at large as a collection of foods, rendered perhaps more necessary, or at all events more instructive, from the great increase in prepared foods that are yearly added to our *menu*, and that if prejudice does not come forward to bar the way, (and it is the purpose of these exhibitions to battle with such prejudices), must add greatly to our home comforts, by economising time and labour in preparation, and placing within the reach of thousands little delicacies and luxuries which otherwise they would not obtain. It makes but little difference whether the articles required be manufactured goods or articles of consumption; if prepared on a large scale, and sold in small quantities, the cost of the lesser parcel will be much cheaper to the individual requiring it than if each one prepared his own, and will probably be of a better quality—as for example, the consolidated soups of the company bearing that name, Messrs. Brand and Co., and Mr. J. Edmunds of Pentonville, amongst others. For a shilling or two, a tin of excellent soup, comprising mock-turtle, mulligatawny, and others, can be purchased, sufficient for a small family, that requires little more than the addition of water to prepare them, while a tin of real turtle, containing three pounds of the meat, sufficient to make two quarts of good soup, or more if the consumer be satisfied with a thinner decoction, can now be purchased retail for three shillings; and these examples may be multiplied to a large extent. We are doubtless within the mark when we say that at least two-thirds of what we consume comes from abroad. Leaving out of the question the teas, coffees, sugars, spices, dried fruits, rice, etc., and wines, for which we have always been dependent upon a foreign or colonial supply, and if we take what may be termed the modern importations only, we shall soon be convinced of the truth of this assertion. For our breadstuffs even we are mainly dependent upon other countries, and it has been computed that we shall, before the gathering in of our next harvest, require to import from sixteen to sixteen-and-a-half millions of quarters, or in other words, we have ourselves only grown sufficient this year for one loaf in three. Butter, we import extensively from Holland, Denmark, America, France, and Italy, besides large quantities of those oleaginous substances called butterine, oleomargarine, etc., from the first-named country and from America. Condensed milk from Switzerland has become an important trade with us, and is regularly ordered with the grocery by thousands of families, in case the fresh lactic supply may at any time fall short. Home-made cheese, for which we had hitherto considered ourselves unapproached, forms but a small portion of our annual consumption. Our famed Stiltons appear to be giving place to the Gorgonzolas of Italy, while the Rocheforts of France, and the Gruyeres of Switzerland are largely consumed, and the Camemberts and other small fancy cheeses, have each their admirers. If we consider quantity, the masses in imitation of our Cheddars and Cheshires sent from America and Canada may be pronounced immense, and that old friend the Dutch cheese still maintains its ground.

If we turn to animal food, we must consider the thousands of head of live cattle and sheep that are weekly imported from the Continent, and the cargoes of dead meat follow each other in such quick succession, that buyers have ceased to ask if it is Foreign or English, and do not concern themselves about the matter. Poultry is sent to us in immense quantities from France and more distant Continental parts, and when we come to the question of dried meats, such as bacon, hams, etc., were it not for foreign importations, our own growth and preparations of the porcine delicacies would be advanced to such a price, as to be prohibitive to a large portion of our population. The matutinal egg is sent to us by the million; and if we turn to the varieties of fish, we find that by a recent experiment of the Hudson's Bay Company, fresh salmon has been brought here from their Possessions at Labrador so successfully, that we may in future expect to receive constant cargoes of it, and to see it upon our tables all the year round if we wish it. We have not touched upon vegetables, of which a large quantity of various kinds are yearly imported. When we come to consider the enormous quantities of tinned meats and poultry, tinned fruits, and fresh fruit, that as the seasons come round find their way to our shores, our great dependence upon the nations of the world is most vividly realised.

Mr. Black has secured the services of some of the most eminent gentlemen connected with hygiene and public health as judges in the different classes, and this is one of the great safeguards in connection with purity and quality that can be adopted, and will tend to promote confidence in the minds of the people. The present exhibition is a fairly representative one, though there are absentees that we should have been pleased to see there. At the time we write, the judges have not given out their awards, but before we go to press we shall be enabled to publish the names of the successful competitors.

Standing in the centre of the Hall, and towering high towards the roof, is an elongated arch of wood entirely covered with the numerous tinned preparations of Messrs. Thurber and Co., Fenchurch Avenue. This colossal firm, an American Company, are without doubt by far the largest food purveyors in the world, and their establishment here is not only intended to supply the English trade, but to assist the development of their business with other parts of the world. Besides their large establishments in America, they have factories in different parts of the Continent, where the products of those countries are prepared, and they have gained a reputation for the excellence and purity of their viands second to none, so that it is not too much to say that anything bearing the name of Thurber may be relied on as genuine. Besides the trade in prepared foods, the firm are dealers in every kind of produce that is grown or bred, and breadstuffs and cereals in their various forms are an important item in their operations.

The well-known firm of Brand and Co., Little Stanhope Street, Mayfair, though not so extensive in their display, brought together a very complete collection of the prepared foods for which they have made their name famous, amongst which were some of the choicest little delicacies capable of being prepared. There is certainly no English firm that sends out such a variety of dainty *petit morceaux* as the Messrs. Brand. Invalid dietetics, to which they have paid great attention, were well represented; their consolidated beef-tea in particular being a speciality for which they are widely known and is extensively recommended by the profession. The preparations of Messrs. Brand & Co. are of the best and most reliable quality.

The preparations of Mr. J. Edmunds of 134, Pentonville Road, are well worthy of note. The household condiments bearing the name of the 'Empress' are all good and reliable, and command a large sale. Baking, egg, and custard powders, are amongst these accessories to the *cuisine;* the baking powder being guaranteed free from alum. The different preparations of chutney and currie emanating from this firm stand high in the epicurean world, and the consolidated soups—the mulliga-

ar—is the best we have tasted in this
ınds has recently introduced an attrac-
crystallised fruits for the approaching
by adding the various Christian names
in specially manufactured gold paper on
uits, and he has had the honour of pre-
ıese to the young Princesses of Wales, and
o, which have been graciously accepted.
ı and Co., Argyle Square, W.C., exhi-
concentrated foods, soups, and gravy-
an inexpensive character; and Messrs.
Sons of Birmingham, whose reputation
mange, and baking powders, is exten-
: with these specialities. Messrs. Yeat-
w Bond Street, also added to the collec-
of exhibits with their well-known yeast
was added the now popular 'calisayine'

oups in a condensed form received an
preparations of real turtle, contributed by
, Jeffreys Square, E.C. The calipash
West Indian green turtle was exhibited
ıse in making soup, also real turtle soup
ns, and sun-dried turtle, which, it is said,
›f a superior quality to that from live
this country, and at one fifth the cost.
hibited a turtle jelly, especially prepared
collection of turtle lozenges, well adapted
.lids, etc.
n and Hildyard, Dover Road, sent a va-
ing and custard powders, digestive egg
ıc-mange powders, flavoured with differ-

ı as tongues, brawns, German and other
variety of other smoked and prepared
gn and English, were shown by Poulton
ıgham Palace Road; Ulisse Colombini,
sco Baretta, Milan; Fratelli, Fiocchi,
an; Pinolini Luigi, Casale Montferrato,
inetti, Milan; Galamberti Ermengildo,
chwappach, Pressburg, Hungary; David
; and Zanotti Enrici, Gropello, Italy.
ı, the herring cured in a variety of ways,
ıppetising character, was exhibited by
Watson and Co., Yare Fishery Works,
Specimens of this humble yet delicate
ep were shown of immense size, as well
ensions, and included the real Yarmouth
cured herring, perhaps the most appetis-
ı, the Yarmouth Digby chick, the golden
, pickled herrings, silver-cured herrings,
herrings. Some of these are sent out in
:, and others in boxes so arranged and
ny attempt at extraction is made it
:tected. This homely piscatorial exhibit
ich and poor.
Stanley and Co., Victoria Street, Liver-
a variety of samples of tinned meats,
›f the Armour Canning Company, the
Armour's Company, and the Wilson
y; they also exhibited Dolby's patent
ng and preserving butter, and a handy
for domestic use in making beef tea,
atent Extractor. The popular London
ıll and Co., Houndsditch, made a similar
their Paysandu ox tongues, with which
now familiar, and that have entered so
ıdjuncts of the breakfast and luncheon
Extract of Beef Company, King William
ıt with the speciality bearing their name.
ıs extract is said to contain the soluble
›m 34 to 36 pounds of the finest beef,
ı and fat, and each shipment upon its
is subjected to careful analysis before
: consumer. Another exhibit of this
by Messrs. Kopf's Extract of Meat and
Company, Cannon Street. This extract,
ı beef, is sent out either in skins or tins,
and has been pronounced by one authority to be 'more nutritious by from eight to ten per cent. than any other in the market'. The firm also manufacture an essence of beef, forming a valuable food for invalids who can take no other form of nourishment, and is also made from English beef. Savoury beef lozenges are another form of bovine nutriment manufactured by Messrs. Kopf, and are extremely palatable and useful for the purposes for which they are intended. Meat biscuits of various kinds, and intended either for invalids or those in robust health, are another distinctive branch with the firm, and are most useful and appetising articles of food. The army and navy biscuits are of another class, these are made with cooked vegetables. They can be eaten as a biscuit, or grated or pounded can be made into an excellent soup, and are very useful to take the place of lime juice on shipboard. Consolidated soups, essences of various kinds, compressed vegetables, and a variety of condiments, indicate Kopf's Extract of Meat Company one of the most useful firms in the consolidated food trade in the metropolis.

The old-established firm of John Burgess and Son, Strand, exhibited an assortment of the numerous sauces, pickles, and other condiments, with which their name has become associated, not forgetting the anchovy, treated in a variety of ways; to which they have always paid particular attention. The Consolidated Food and Soup Company, Castle Street, Finsbury, also contributed a good collection of their various preparations, which are so well known that it is unnecessary to mention them in detail. Turning to cereals, both in their natural ground form as flours, and in the condition of cooked foods, both for infants and adults, the display was varied and extensive, though it is not necessary to mention all of them in detail. Amongst the most noticeable we may call attention to the prize medal Edinburgh oatmeal and oat cakes of Messrs. J. Thomson and Sons, Leven Street, Edinburgh; the biscuits of various kinds of Messrs. Gray, Dunn and Co., Kining Park, Glasgow, biscuit bakers to Her Majesty; the dietetic biscuits of Mr. Blatchley, Oxford Street, W.; the excellent collection of flours, and nearly all other cereals, of Messrs. Carwardine and Co., City Road, London; Dr. Ridge's food for infants, etc.; an interesting assortment of pure wheat meal bread, porridge grits, meal, and biscuits, from King's Bread and Biscuit Company, Blackman Street, S.E.; Messrs. Savory and Moore's noted foods for infants, adults, consumptive persons, etc.; and a collection of the special pharmaceutical preparations for which they are famous; Messrs. Lloyd and Co.'s 'Universal' cooked foods, of which we have given full descriptions on former occasions, and which appear to be increasing in public favour; and a very interesting collection of specially prepared and cooked cereals from the Cereals Manufacturing Co., New York, exhibited by their London agent, Mr. R. Lampe, 44, Great Tower Street.

Passing over such articles of food as pork and veal and ham pies and kindred food, of which we had exponents from Leicester, etc., we come to the various kinds of condensed milks, milk foods, etc., in which most of the popular firms were represented. The Anglo-Swiss Condensed Milk Company, Mark Lane, not only exhibited the lacteal fluid in its ordinary condensed form, but supplemented their display with prepared coffee and milk, cocoa and milk, and chocolate and milk, each of which possess good flavour and are easily made, and are sold in tins, the same as the condensed milk; infants' food similarly prepared completed the exhibits of the company. The Anglo-Scandinavian Condensed Milk Company, Monsell Street, Aldgate, sent their production, which is the milk of cows grazing on the mountains of Scandinavia, said to give the purest and richest milk in the world; and in no wise deficient was the exhibit of Henri Nestlé, of Snow Hill, E.C., whose preparations are now well known, and contain all the cream of the original milk. The Aylesbury Dairy Company were represented by a large enclosed stand, in which their various preparations of milk, and its component parts, were shown, together with that ingenious implement, the Danish Cream Separator, and a quantity of butter-making machinery. The First Swiss Alpine Milk Exporting Company, through

their agent, Mr. J. P. Warner, 46, New Bond Street, W., sent a collection of their product both in tins and bottles. This milk is prepared without sugar or any other foreign substance, and was exhibited in bottles in a preserved form, also, and without admixture. It is rich in flavour and well adapted to take the place of the fresh commodity. This class of exhibits was completed by that of Messrs. Lehmann and Company, Fenchurch Street, who, in addition to their ordinary preparations of Swiss milk, both sweetened and unsweetened, cocoa and milk, coffee and milk, and chocolate and milk of the 'Milkman' brand, with which we are now so familiar, sent their new infants' food, made with Œttli's Swiss Milk. This preparation, which has been in use for many years in Switzerland and Germany, has been proved to be more easy of digestion than most other foods, being more of a milk soup than a farinaceous preparation. The important feature obtained by Œttli's infants' food is the elimination of the starch and the transformation of the wheat flour into gluten. Although only recently introduced here, it is rapidly increasing in sale, and promises to take an important place in this class of dieterics.

The collection of teas, coffees, cocoas, and chocolates, was numerous as regards individual exhibits, and in the last named were to be found several foreign makes; but it possessed no particular feature of interest that we are not already acquainted with to render it necessary to enter into detailed remarks.

The display of foreign cheeses was not large, and butter was scarcely represented. This, perhaps, is not so much to be wondered at, seeing that we so recently had such an extensive display of those products on the occasion of the Dairy Show in the same building. Olive oils, honey, a few examples of wines, including an Australian exhibit, one of liqueurs, and a few of whiskey, completed this portion of the display.

A solitary exhibit of English jams and preserves, by Mr. Beach, a name long known in connection with the fruit trade, attracted much attention, though we were not aware that London possessed a fruit and preserve farm within the radius of the postal district. Mr. T. W. Beach, of Ealing Lane Gardens, Old Brentford, W., whose family have held possession of the grounds for many years, grows his own fruit, and preserves it on the premises by steam apparatus, which prevents burning. The advantage gained by this is apparent. The fruit, instead of being packed and having to travel a considerable distance, exposed, for part of the time at least, either to the heat of the sun, or perhaps wet weather, is here picked from the trees and carried at once to the jam-making rooms, thus avoiding all the danger and injury that must more or less occur to fruit treated in the ordinary manner. Then again, as Mr. Beach grows his own material, he takes care to gather it in seasonable weather, and so secures it under the most auspicious circumstances. The only sugar employed is the refined or white, and no glucose whatever is used. This is, therefore a pure preserve, in which the natural flavour of the fruit is retained, and no more saccharine matter added than is essential for the purpose. Mr. Beach's preserves are much sought after at the West End of London, and command a higher price than most others, and deservedly so; but until recently we believe his name has not appeared on them, hence the reason they are not more generally known.

The collection of mineral waters and non-alcoholic beverages was rather extensive, but call for no particular remark, most of them having been mentioned by us on previous occasions, but we may mention Messrs. Evans, Son, & Co., Hanover Street, Liverpool, who, as usual, made an attractive display of their popular Vin Santé and Montserrat Lime-fruit Cordials and Syrups; also the new Lime-fruit Sauce, which is a wholesome and pleasant addition to the list of condiments, and takes a silver medal. The proprietors of Zoedone were no less prominent with their speciality, and also secured the silver acknowledgment from the judges. The Antitropic Co., 20, Stamford Street, Blackfriars, were present with their various preparations of Glacialine, which is winning for it considerable reputation. A small packet dissolved water will give one gallon of preservative that will, cording to assested statements, protect several c of meat, fish, or game from becoming tainted. I also made as a special preparation for fresh butter, preserving which it is alleged to be very successful, is again produced as a 'Rose Extract', in which form used for keeping meats fresh that are hung for any le of time, and preserving the colour; it can be used in ei the dry or liquid forms. Rennet and Annatto are also pared by the Company: their exhibit, as a whole, ma fairly said to have been one of the most useful in the I

Messrs. Feltoe & Sons, Albemarle Street, appear to no opportunity of exhibiting their 'Spécialité' Lime-ju which is deservedly increasing in public favour; and Thomas Grant of Maidstone, the well-known make Morella Cherry Brandy, made an attractive display of popular compound, including the 'Queen's' quality, supplied to Her Majesty and other royal personages; 'Sportsman's' quality; another example named 'Ch Bounce', and 'Maidstone Hollands'.

A collection of Australian wines of commendable qua from their own vineyards and from those of other grow were contributed by Messrs. P. B. Burgoyne & Co., Old Broad Street, to which we may have occasion to re in a future number of the SANITARY RECORD.

No exhibition of this character is considered compl without some show of machinery and apparatus used some of the processes of manufacture and cooki Accordingly, a collection of useful domestic articles w brought together, such as sausage and mincing machin vegetable slicers, bread-cutting machines, etc., from M Arthur Lyon, Windmill Street, Finsbury. Messrs. H. & C. Davis and Co., of Camberwell, sent an extensive colle tion of gas cooking apparatus, which were utilised by th judges for bread-baking and other little experiments in cooking in order to test some of the Exhibits, and the firm were awarded a silver medal for their appliances. The same firm also exhibited, for the Anglo-American Ti Stamping Company, an excellent assortment of their ware, principally enamelled on the American system, and especially adapted for use with gas stoves. Kneading and mixing machinery was also to be found amongst the exhibits, that of Mr. Paul Pfleiderer of Farringdon Street, coming in for a good share of attention, another being the Patent Centrifugal Dough Kneading Machine of Mr. Thomas Lindop of Middlewich, capable of mixing from four to six sacks, or 280 lbs., in fifteen minutes, or thirty sacks, or 2700 4-lb. loaves, per day. Gas Engines for driving this and other machinery were exhibited, consisting of the well-known 'Otto' of Messrs. Crossley Brothers, of the Poultry and Manchester; the 'Linford', by a maker of that name, from Leicester; and a new one of the London Gas Engine Company, 161, Strand, which we may have an opportunity of describing in a future number. There were also a variety of the smaller kinds of appliances used for making bread and pastry; cooking and heating stoves, including the 'Crown Jewel' stove of Mr. H. Hunt, now advertised in our pages; and Mr. Adams, of Great Dover Street, sent an exhibit of his Patent Sashes, Fanlight Opener, Locks, etc.

The following is a list of the awards:—

SILVER MEDALS.—Davis, H. & C., & Co., 200, Camberwell Road, S.E., for Gas Cooking Apparatus; Challen D., 121, Mildmay Road, N., for Vanilla, Flavouring Essences, and Wilson's American Biscuits; Anglo-Swiss Condensed Milk Co., 10, Mark Lane, for Condensed Milk; Dunn & Hewett, Pentonville Road, for Rock Cocoa and Manufactured Chocolate; Burgoyne, P. B., & Co., 54, Old Broad Street, E.C., for Australian Wines; Yeatman & Co., New Bond Street, W., for Yeast Powder; Thurber, H. K. & F. B., 9 & 11, Fenchurch Avenue, E.C., for Cereal Products; Thurber, H. K. & F. B., for Canned Meats; Phillips & Co., 8, King William Street, E.C., for Tea; Evans, Sons, & Co., Hanover Street, Liverpool, for Lime Fruit Preparations and Lime Juice Sauce; Vin-Santé Co., for Orange and Tonic Champagne and

ury Dairy Co., St. Petersburgh Place, Peptonised Milk and Koumiss; Free- 27, Great Dover Street, Borough, e Baking Powder; Tulloch, W., & Bury Street, St. Mary Axe, E.C., ocoa; Poulton & Noel, 76, Bucking- for English Preserved Meats, Brawn, edone Company, Wrexham, for Zoe- is sucre; Burgess, J., & Sons, 107, ved Anchovies, Sauces, and Pickles; Brentford, for Genuine Jams; Vicars, treet, Liverpool, for Biscuit Making Range and Foundry Co., 168, Fleet Cooking Ranges; Wilson Engineering ilborn, for Cooking Ranges; Lingner & le Delicacies; Meignen, P. A., 22 and itreet, E.C., for Improved Application le'.

S.—Thomson, J., & Son, 3, Leven for Oatmeal and Oatcakes; Stacy- at Yarmouth, for fine exhibit of Cured : Co., 11, Little Stanhope Street, W., l other Concentrated Extracts of Meat; Pentonville Road, for Curry Powder and nore, W., Vulcan Pie Works, Leicester, Sausages; Chemists' Aërated & Mineral Limited, 45, Gifford Street, N., for ers; Begg, J. & Co., Manchester Road, Moselle, Ginger Ale, and Lemonade; an Enamelled Ware Co., per Davis, H. Camberwell Road, S.E., for Enamelled Co., Argyle Square, W.C., for Concen- ey & Davis, 148½, Fenchurch Street, onery and Fruits; Carwardine & Co., ., for Wheat and Flour; Bellis, T. K., E.C., for Sun-dried Turtle and Turtle 22, Walbrook, and at Maidstone, for id Maidstone Hollands; Weston & r Thames Street, E.C., for good exhibit , T. F., Buda Pesth, Hungary, for Hun- excellent quality of Hungarian Flours; n, 337, Kingsland Road, N., for fine King's Bread & Biscuit Co., 56, Black- for Pure Wheat Meal, Bread, and Bis- H., 13, North Street, Exeter, for Qui- iic. and Orange Champagne; Pfleiderer, 1 Street, E.C., for Mixing Machines; of Beef Co., 48, King William Street, of Beef; Savory & Moore, 143, New r Pharmaceutical Preparations; Beretta, for Excellence of Exhibit; Toninetti, ial processes for preserving Meat and & Co., 5, Sugar Loaf Court, Leaden- for Chocolatine; Constantine, J., 61, for Cooking Ranges; Davis & Little- ph Lane, E.C., for 'Glencoe' Highland and Co., 106, Fenchurch Street, E.C., ondensed Milk; Jacob, —, for Vienna : Sons, 14, Tabernacle Walk, E.C., for icers; Williams, T., 8, West Smithfield, Machines.

IENTION.—Noble & Co., 3, Savage Hill, E.C., for Bjorkboni's Malt Extract, t & Co., 134, Fenchurch Street, E.C., npressed Vegetables for Soups; Fientt Street Buildings, for Gorgonzola and Campini & Co., 16A, Redcross Street, ian Wines; Lyon, A., 32, Windmill quare, E.C., for Mincing, Slicing, and Pelling, Stanley, & Co., 4 & 6, Vic- pool, for Dolby's Patent Extractor; 1 Co., Limited, Acton Street, Hagger- Extract of Cocoa; Feltoe & Sons, 27, W., for 'Specialité' Lime Juice; Goun- pper Thames Street, E.C., for Conso- E. C., M.R.C.S., 78, Waterloo Road, d Feeding Bottles; Hart, D. & Co., City Road, E.C., for Weighing Ma- chines; Osborne, Charles & Co., Ormside Street, Old Kent Road, for Royal Vinegar, Spiced; Gulliver, S. & Co., Vale of Aylesbury, for Whiskey Curacoa; Self-Open- ing Tin Box Co., 47, Holborn Viaduct, for Self-opening Tin Boxes; Fratelli Fiocchi Fu Antonio, Milan, for Salami; Ealmoni, Michele, Torino, for Chocolate; Carulli, D., Cremona, for Sausages; Zanotte, E., Gropelli, for Sausages; Audiffredi, V., & Co., Turin, for Vermouth; Scott, R. M., Great Barton Flour Mills, Bury St. Ed- munds, for Self-raising Prepared Wheat Meal; Coneybeare, J., Pelton Road, East Greenwich, for Sausage Chopping Machine, with improved break; Branson & Co., 10, Rood Lane, E.C., for Coffee Extract; Youard, M., 25, Spencer Street, E.C., for Mangoe Chutney; Waygood & Co., Falmouth Road, Great Dover Street, S.E., for Sugar Chopper; Jolley, E. H., 26, Hosier Lane, Smithfield, E.C., for Ice Making Apparatus.

SUPPLEMENTARY CLASS OF EXHIBITS.

MEDALS.—Heron, T., 4, Pump Street, London Road, Manchester, for Gas Burners; Adams, R., 7, Great Dover Street, S.E., Medal for Improved Appliances for Win- dows and Doors; Hayes & Son, Stamford, Medal for Parcels Van, etc.; Lilly, J. 166, Fleet Street, E.C., for Linford's Gas Engine; London Gas Engine Co., 161, Strand, for Gas Engines of various powers at work; French & Co., 71 & 73, Commercial Street, for Steam Traps; Stott, J. H., 49, Halton Road, N., for Gas Regu- lators; Crossley, Bros., Halifax, 3½ h. p., Otto Gas Engine.

LAW REPORTS.

THE FULHAM SMALL-POX HOSPITAL.

The case of *Chambers* v. *the Metropolitan Asylums District Board*, was again before Mr. Justice Cave and Mr. Justice Kay on September 5th, sitting as a Divisional Court, upon an appeal by the plaintiff from an order made by Mr. Justice Bowen, adjourning till the trial of the action a motion for an injunction to restrain the defendants from using their hospital at Fulham for the reception of small-pox patients. The plaintiff is the proprietor of the Lillie Bridge Grounds, and alleges that in consequence of the erection of this hospital a large portion of his patronisers have ceased to use his grounds, entailing upon him heavy loss. The action is, however, the result of an agitation that has been in progress for some time past, and Mr. Chambers is only a nominal plaintiff, the suit being brought on behalf of the inhabitants of the district, and the costs being defrayed by public subscription. This appeal was argued at some length on August 25th last, and was adjourned to enable the direction of the Local Government Board to be obtained upon a suggestion made by their lordships to the effect that the defendants should undertake not, until the trial of the action, to use the hospital except for cases occurring within the Fulham district.

Sir Hardinge Giffard, Q.C., who, with Mr. Gainsford Bruce and Mr. Proudfoot, appeared for the defendants, stated that correspondence had taken place between the parties, but he regretted to say they had been unable to come to terms, and the motion must now be heard in the ordinary course.

Mr. Bompas Q.C. (with whom was Mr. Bottomley Firth, M.P.), then continued his address in support of the motion, and read an affidavit by the public officer of health for the district showing that the hospital was a danger and a nuisance to the inhabitants. Dr. Coffin, of West Ken- sington, also made an affidavit stating that since the opening of this hospital small-pox had become prevalent in the parts of the parish nearest thereto. Within a radius of a quarter-of-a-mile seventy-three cases had occurred since the opening, and that district was not a thickly-popula- ted one. Such a number was greatly in excess of the average of the rest of the parish and the metropolis generally, and was no doubt caused by the proximity of the hospital. Dr. Francis Egan confirmed the views of Dr. Coffin, and stated that there had been a great increase in

the number of cases since the reopening of the hospital, and those cases for the most part occurred in the neighbourhood immediately surrounding the building, many of them in houses of a better class. Speaking of past epidemics, the deponent stated that outbreaks of small-pox had always followed, and not preceded, the gradual filling of the hospital, and that the decrease of the epidemic round the building had always followed, and not preceded, the decrease in the number of patients admitted. Dr. Carr, who had practised for seven-and-a-half years in the district, and Dr. Thorn, who had an eleven years' practice there, had also made affidavits to the like effect. By way of scientific evidence, the plaintiff filed an affidavit by Dr. Septimus Gibbon, the Medical Officer of Health for the Holborn district, who was of opinion that the present system of aggregating a large number of patients in a building situate in the midst of a crowded population was altogether a mistake. The chances of recovery to the patients themselves were lessened, whilst the disease was spread by infection from the ambulances along the roads through which they passed. These facts were proved by the statistics of the last two epidemics of small-pox. In the epidemic of 1871-2 the deaths in the metropolis numbered 9,657, whilst in that of 1876-8 the deaths numbered 4,570, making an average of 7,132½ deaths from each epidemic, whereas in each of the previous seven epidemics that had occurred since vaccination was introduced, the deaths averaged only 2,185, the highest number occurring in any single epidemic being 6,270, in 1866-7. Dr. Richardson had also made an affidavit, stating that for the past twenty years he had made a special study of these matters, and had written several works upon the nature of infectious diseases. He was of opinion that the system adopted by the Metropolitan Asylum District managers was one of very serious danger to the community. It was not sufficient protection to have the building well ventilated; indeed, the more ventilation there was the greater risk was there of the germs of the disease being carried about by the wind, to the peril of the surrounding neighbourhood. All the officers of the institution were so liable to spread the disease outside that it was almost impossible to provide adequate supervision in such a large hospital as this, even if it could be done in smaller ones. The accumulation of a large number of cases in the district immediately round the building was, in his opinion, due to the presence of the hospital, and its continued maintenance in its present form was a great public nuisance and a serious danger.

Their lordships here intimated that in their opinion a *prima facie* case had been made out by the plaintiff—at any rate, for an injunction against the reception of foreign cases—*i.e.*, cases outside the Fulham district.

Mr. Bompas said the plaintiff would be satisfied with an interim injunction on those terms, as he believed the disease would almost die out of itself if it ceased to be promoted by the introduction of virulent cases from other parts of London.

Sir Hardinge Giffard was then heard in reply. It must not be taken, he argued, that the statements in plaintiff's affidavit not contradicted by the evidence for the defence, were, therefore, admitted to be true. When the proper time came the Board would be able to controvert the scientific evidence just read, and would take care to sift the medical evidence, believing they would be able to show in every case of small-pox attributed by the plaintiffs to the existence of the hospital that it was in reality due to infection from some other source. Small-pox existed independently of the hospital, and it was absurd to talk of it as if it were some noxious manufacture of the defendants.

Mr. Justice Kay: There is the fact, proved by several witnesses, that since the opening of the hospital small-pox has increased very much in the immediate neighbourhood—more than in the district beyond it.

Sir Hardinge Giffard said the evidence to that effect was contested. The houses in the vicinity of this building were of a very poor class and much overcrowded, and if an outbreak occurred in such a district, even taking as established the theory of Dr. Richardson as to the communicability of this disease by the spread of germs, it was more likely to have originated in some house in the dis in this establishment, where every possible p against infection was observed. As a matter of fa a most beneficial thing for the neighbourhood i there should be an institution in which comp absolute isolation was possible.

Mr. Justice Kay: That argument does not app present state of the case. The plaintiff will not tent with an injunction against the reception o patients. That is the case you have to meet.

Sir Hardinge Giffard replied that if such an i were granted in respect to this hospital, the inhal Homerton or Stockwell might come to the cour similar relief in respect to the establishments in t tricts. This hospital had been in existence sinc 1877, and the plaintiff, after waiting till May of before issuing his writ, had again rested, and now this Court in the middle of the Long Vacation, an by an interlocutory injunction, to stop the work great public institution.

Mr. Justice Cave pointed out that the liabili Metropolitan Asylums District Board to the public exhaustively fought out in the case of the Hu Small-pox Hospital, and this case, being on pars with that, the plaintiff had a perfect right to as interlocutory order.

Sir H. Giffard admitted that the Hampstead ca be used as a guide in certain matters of law wh then settled, but the facts of the two cases wer distinct. The whole of the law lords, in confirn verdict of the jury in that case, expressed their di tion with it, and Lord Watson went so far as to sa did not understand that the jury affirmed the imp of erecting a hospital for the treatment of small- lesser scale, and, according to a different plan, e the site at Hampstead, or the impossibility of p elsewhere a suitable site upon which a hospita same kind and dimensions as that complained of erected and used without creating a nuisance. occupied by this building at Fulham was the very could be obtained in any part of the metropolis, e the hypothesis of the communicability of disease proximity of such a building. On the one side Brompton Cemetery, and on the other the near was 170 yards. If their lordships granted the application they would be prejudicing the defend at the hearing. There had been what must be call flammatory agitation for the abolition of this institu subscription lists had been opened at Tattersall's a places towards the expenses of this suit. A large n affidavits had been filed by the plaintiff, he having time to prepare his case; but, as the evidence fo fence could not possibly be prepared in time, their would really be deciding the whole suit with evidence of one side before them. They would hold the proposition that the disease was propa germs blown about in the air had been scientific blished, although he would be able to call scientifi eminence to disprove that theory. This hospital a site consisting of six acres, and was divided pavilions with administrative offices, including apartments for the nurses and other officers. The the building were approved before the institu opened by the Local Government Board. The were separate, and had lofty windows on the two l opening at the top as well as the bottom, so tha mission of fresh air and the exit of foul air were provided for. It was said that this very ventilati cause the spread of the disease, but scientific evide to show that the destruction by the oxygen of germs was all but immediate, and that it was impo the germs to be carried to any considerable distanc the nearest house was 170 yards from the buil argument as to infection by this means fell to th The learned counsel then read a number of affidavi Thomas Daniel, F.R.C.S., and others, to the effec hospital was a boon and not a danger to its loca that the cases which had been attributed to the

uilding, occurred among a class of people who
ı overcrowded houses, and who had not been re-
d, and were careless as to exposing themselves to
er of infection. The statistics given in Dr. Gib-
davit were unreliable, as he took no account of the
of population, which amounted to 25 per cent. In
n, Sir Hardinge Giffard stigmatised this action as
ipt to cripple and cramp the operations of the
itan Asylums Board in their efforts to get rid of the
by taking the patients from the crowded thorough-
isolating them, so as to effect their cure and stop
d of the disease.
ainsford Bruce having been heard on the same

ıstice Cave said that as the hospital had been
be a nuisance to the surrounding occupiers of the
they were entitled to the relief they sought. No
s hospital was managed with the greatest care, but,
ess, there were affidavits showing that there was
ive number of cases in its immediate vicinity, and
dants did not offer any satisfactory explanation of
The Medical Officer of Health for the district,
al general practitioners, cognisant of the state of
the district, attributed this excessive number of
he existence of the hospital. Therefore, as a case
made out upon which the Court ought to act, the
ory injunction would be granted.
stice Kay regretted exceedingly that the decision
e had been forced upon the Court, as it seemed to
ould have been better if the parties had been able
to some arrangement, at any rate, until the case
heard and decided upon *viva voce* evidence. He
say as little as possible to prejudice the question
uld have to be decided at the trial—viz., whether
is hospital was a nuisance. Upon the affidavit
which had been filed it seemed to him that there
nsiderable danger of infection in the immediate
hood of the hospital, and he thought it was a fair
to be drawn upon the balance of that testimony,
ngs were allowed to go on as they had been going
here should be a great outbreak of small-pox in
ing districts before the cause was heard, and
ould be brought in considerable numbers to the
he Fulham district would be infected to a very
nt. Looking at that probability, it seemed to him
necessary that the Court should interfere to some
The order which the Court made would be pre-
he declaration that it was without prejudice to
on in the cause, and would be only granted upon
iff giving the usual undertaking to be answerable
s if the Court should hereafter think this order had
l any pecuniary damage to the defendants. Upon
tion the Court granted an injunction restraining
lants, until the hearing of the cause or further
ı bringing any patients to the hospital in question
district lying beyond a radius of one mile from
g.

F NOTES OF USEFUL CASES.

SMALL-POX HOSPITAL.

A. G. v. *Fulham B.W.* Motion for Injunction the erection of a temporary Small-pox Hospital—stand over, the balance of public convenience vour of the Hospital—Liberty to plaintiffs to apply he Court after the Hospital was opened—Under-defendants not to receive more than 50 patients (*Times*, May 23, 1881.)

LIBEL ON OVERSEER.

Valdry v. *Fletcher*. Action of Libel by an Assist-er—Libel contained in letter from one ratepayer imputing to plaintiff long habit of mismanaging Defence (1) no libel (2) privilege (3) no malice—favour of plaintiff held good by Divisional Court, rds by the Court of Appeal. (M.S.)

PAVING EXPENSES.

Gould v. *Bacup L.B. etc.* "Public Health Act, [="Public Health Act, 1875" 150]—Paving etc. expenses—Notice by Board that it intends to treat unpaid expenses as Private Improvement Expenses binds the Board so that it cannot recover afterwards by summary process. (50 L.J., M.C., 44; 44 L.T., 103; 45 J.P., 325.)

VILLAGE GREENS.

1880. *Goddard* v. *Robson*. Grass plot alleged by one party to be unenclosed land of the plaintiff's; by the other party to be a village green to which the villagers were entitled to have free access at all times—There being the verdicts of two Juries, upheld by two Judges, in favour of the villagers, the Court of Appeal refused to grant another new trial. (*Times*, Nov. 23, 1880.)

RATING OF WATERWORKS.

1880. *New River Co.* v. *St. Pancras Vestry*. Claim of exemption from Rating under special Act disallowed. (45 J.P., 75.)

INTEREST OF JUSTICES.

1880. *Reg.* v. *Lancashire JJ.* Justices members of an Urban Sanitary Authority held justified in declining to hear an Information laid before them for breach of a law in the vindication of which they were *ex officio* interested. (*Times*, Dec. 22, 1880.)

CHURCHYARD GARDEN.

1876. *St. George's-in-the-East Rector and Churchwardens, In re.* Application for Faculty to appropriate a portion of a Churchyard closed for Burials for the purpose of a Public Garden—Faculty granted under restrictions to the effect that Footpaths might be made and improvements carried out short of throwing open the ground promiscuously as a general Recreation Ground—*Reg.* v. *Twiss* followed. (L.R., 1 P.D., 311; 25 W.R. Dig., col. 104.)

BRICK-BURNING NUISANCE.

1881. *Smith* v. *Taylor*. Burning of bricks in a rural locality where manufacturing processes were not usual—Comfort of occupiers of houses interfered with, and therefore Injunction granted. (*Times*, May 6, 1881.)

RECREATION GROUNDS.

1880. *Willes* v. *Leamington, Mayor*. Obelisk erected to commemorate a local celebrity—Dispute as to ownership of soil—Injunction to prohibit completion of obelisk refused; the parties building to proceed at their peril subject to a future decision in an Action of trespass as to the ownership of soil. (*Times*, Nov. 8, 1880.)

HIGHWAY.

1881. *Alresford Rural Authority* v. *Scott*. "Highway Act, 1835," s. 51—A Surveyor may obtain a license from Justices (if they think fit to grant one) to "gather" stones lying upon any enclosed lands in the parish without making any satisfaction to the owner for the stones taken. (50 L.J., M.C., 103; L.R., 7 Q.B.D., 210; 45 L.T., 73; 45 J.P., 619.)

MEETING TO ELECT OVERSEER.

1881. *Reg.* v. *Fletcher*. Vestry Meeting—Election of Overseer—Poll—Scrutiny carried out at an improper time and in an improper way—*Mandamus* granted ordering the defendant (the Vicar of the Parish) to call another Vestry and proceed to a new election—Defendant to pay the costs as his conduct had not been careful or reasonable. (*Times*, March 21 and June 17, 1881.)

HIGHWAY.

1881. *Reg.* v. *Duncan*. Indictment for Obstruction—Special finding that there was once a road but that the improvements which defendant had made were not of material damage to the public—Whereupon the Judge directed a verdict of "not guilty"—Practice—New Trial refused when a defendant has been in peril of imprisonment. (50 L.J., M.C., 95; L.R., 7 Q.B.D., 198; 44 L.T., 521; 45 J.P., 456.)

HIGHWAY.

1880. *Savin* v. *Oswestry H. B.* "Highways Act, 1878," s. 23—"Extraordinary traffic"—Highway so seriously damaged so as to need entire reconstruction—Held that as the expenses of reconstruction could not be separated from the expenses of repairs the defendant was

properly adjudged to pay the large sum of £500, and this notwithstanding that the road had not been originally well formed—Where the Q.B.D. exercises its Common Law Jurisdiction there may be appeal to Court of Appeal though leave refused. (L.R., 6 Q B.D., 309; 44 J.P., 766.)

REVIEWS.

A Digest of the Law relating to Public Health and Local Government. By G. F. CHAMBERS. Stevens and Sons, 119, Chancery Lane.

THIS large and handsome volume is the eighth edition of a work which is probably well known to all our readers. The author points out in his preface that eight editions, comprising 5,000 copies, having been called for in the comparatively short space of nine years, he hopes he may be permitted to infer that the work meets satisfactorily the requirements of those who have to use books relating to Public Health law. At any rate, he finds that it is in great and constant request, not only with the legal profession, but with Clerks of Local Authorities and Medical Officers of Health, which fact has encouraged him to make renewed efforts to keep up the repute of the book and to augment its usefulness. The book is divided into five parts, respectively designated, 'Digest of Statutes', 'Statutes relating to Sanitary Authorities', 'Precedents', 'Official Documents', and 'Digest of Cases'.

Part I. The 'Digest of Statutes' is divided into six chapters, in which is presented a concise and handy abstract of the statutes relating to the constitution of Urban Sanitary Authorities, their meetings, business arrangements, officers, and general powers and duties, and, in separate chapters information is given respecting the constitution and controlling powers of the Local Government Board, the procedure respecting provisional orders, and a summary of the sanitary functions of guardians of the poor.

In Part II, some fifty or sixty Acts of Parliament relating to Public Health and Town Improvement matters are given in full. These Acts range from the 'Quarantine Act, 1825', down to the 'Petroleum Hawking Act, 1881', and, of course, include the 'Public Health Act, 1875', All are annotated with short notes and numerous cross references. This is particularly the case with the 'Public Health Act, 1875'.

Part III comprises precedents of regulations with respect to the meetings and business arrangements of Local Boards, and the duties and conduct of officers. The practice being a rapidly-growing one of Urban Sanitary Authorities undertaking the supply of gas, a form of provisional order for this purpose is given.

The official documents given in Part IV are eighteen in number, being a great many more, we believe, than have appeared in previous editions. Whilst most of the circulars relating to Public Health which the Local Government Board have issued during the last five years will be found here, and do not need to be particularised, there is one official document which we fancy is not generally known, but which will be extremely useful to the Clerks of Local Authorities which are proposing to borrow money. We are alluding to a table which shows the annual amount of principal combined with interest which is requisite for the repayment of loans at rates of interest from three to six per cent. in any period varying between one and fifty years. This table will save Clerks an immense amount of trouble in making calculations, besides securing an accuracy only otherwise attainable by great labour in computation.

Probably the most valuable portion of Mr. Chambers's volume is Part V, the 'Digest of Cases'. Here are exhibited in a concise form, with ample references, no fewer than 1,270 legal decisions relating to Public Health law, and brought down to as recent a date as the middle of last October. These cases are grouped under upwards of 100 titles, and constitute a body of legal decisions on Public Health law, the usefulness of which to Municipal Corporations and Sanitary Authorities generally is obviously so great as to render the work in which they appear absolutely indispensable to every Clerk of a Local Authority. The book ends with several indexes, the last of which, termed the general index, is extremely elaborate, as will be understood from the fact that it covers forty closely printed pages; it does not, however, otherwise call for any special remark.

From the foregoing statement of the aim and contents of Mr. Chambers's book it will be readily understood that it is both the largest and most complete treatise on Public Health law hitherto published.

On the Valuation of the Relative Impurities in Potable Waters. By G. W. WIGNER, F.C.S., F.I.C.

This paper will be found in the July number of the *Analyst* of the current year. It embodies a serious proposal for 'the systematic valuation of the impurities found in potable waters', by affixing a numeral to each impurity according to the quantity present, and classifying the water by taking the sum of all the numerical valuations thus obtained, an arbitrary standard of purity for the various classes being fixed beforehand, 'the purest public supplies' affording the standard of excellence.

There is one statement made by the author in his prefatory remarks which seems hardly likely to meet with such general assent as he assumes, viz., this:—'If any constituent of a water, no matter what, is found in undue or excessive proportion, it ought to be sufficient to condemn that water for domestic use.' It is just here that the weak point of the system lies. Not only may one, but even two or three of the constituents of a water exceed largely the average proportion found in potable waters, without affording any just cause for condemning the liquid as a domestic agent. It must never be lost sight of that the question of paramount importance to be answered by the analyst in recommending or condemning a water for domestic use is, 'Has this water been subjected to recent sewage contamination?' Now some of the ingredients of natural waters are indicative not of *recent* contamination with sewage, but of such contamination having taken place at a more or less remote period. Such impurities are small free ammonia, chlorides and nitrates. But, if a water submitted to analysis happened to be rich in these ingredients, yet possessed a bluish or slightly greenish tint in the two-foot tube, was free from suspicious odour at 100°, yielded only a trace of albuminoid ammonia, and consumed no oxygen, we should not be justified in condemning it. Again, if a water consumed very much oxygen, showed a brownish tint, and was found to contain vegetable débris by microscopical examination, yet yielded but little albuminoid ammonia, and contained only traces of chlorides, it might be safely recommended for domestic use; yet both these classes of water would be condemned by Mr. Wigner's valuation scale. Thus, in Table V, the water *j* from a shallow well has a clear pale blue colour, no odour, contains only 'traces of phosphoric acid in phosphates, absorbs only .002 gr. per gallon of oxygen in two minutes at 80° Fahr., and reveals 'vegetable fibres and leaves' under the microscope; yet because it absorbs .102 gr. per gallon of oxygen after three hours at 80° Fahr., and yields .0118 gr. per gallon of albuminoid ammonia, which, taken in conjunction with the other evidence, point to the presence of some difficultly oxidisable vegetable matter; and notably because it contains as much as *two grains* per gallon of nitrogen as nitrates, and 6.63 grains per gallon of chlorine as chlorides, which, taken in conjunction with the other evidence, point not to recent, but remote contamination with sewage, it receives the high valuation of 89. Now had this water contained sewage in proportion indicated by the albuminoid ammonia it yielded on analysis, its colour in the two-foot tube could hardly have been 'clear pale blue'; it would also probably have possessed a distinctive odour, and its microscopical examination could hardly have failed to exhibit some animal *débris*. Moreover, it would probably have absorbed much more oxygen in two minutes. It

ber that as a rule the most readily oxidisable ıe most injurious.

selected, as illustrating what seems to us the Mr. Wigner's system, viz., the impossibility tress upon a preponderance of one or even ;redients in a water without considering the ntity of all the other ingredients. To put few words, Mr. Wigner proposes to give to ity of any one ingredient in a water a fixed any regard to the other ingredients at all, he nature of the case, the quantity of each have a shifting value according to the nature the other impurities present. No one will rmity is to be aimed at in the opinions given :mists, as to the potability or the reverse of ', but if this result is to be obtained by a ess at all, which seems in itself doubtful, it ot by simple addition, but by a combination subtraction, since some of the results given ıerally tell against, and some for the pota- ıter. No numerical value is attached in the natural history of the water, presence or ces of contamination in the neighbourhood, ; important matters in deciding the point at mere numerical results obtained by analysis. ıny interesting points in Mr. Wigner's paper, ony he bears to the efficiency of 'Clark's wn by the remarkable purity of the water city of Canterbury.

ık forward with interest to the result of the ıe subject of this paper, which is advertised January next.

CORRESPONDENCE.

ations must bear the signature of the writer, not necessarily for publication.]

YEARS' EXPERIENCE OF THE IG-OUT OF PAUPER CHILDREN.

g for your information the following return vith the boarding-out of pauper children in :house, I beg to mention that, when a Mem- ıard of Guardians, and Chairman of the Committee, I found that the mortality of o were endeavoured to be reared in the ıs excessive. In fact, few infants who are ıain in the Workhouse have any chance of inging the subject before the Local Govern- entreated of them to have inquiries made ın of infants in the other Workhouses, when t in many of them the mortality was equally the Tralee Workhouse it was proved by the Inspector that within a space of ten years ıhan and deserted infants were admitted to ;e, and out of that number forty-six died, so ıf fact, that Workhouse was a living grave lar class of children. It is now my pleasing before you the results of the Boarding-out :d by the Cork Board of Guardians on the Act of Parliament in 1862, which enables ırdians to send out all orphan and deserted thirteen years of age to be reared in the

sent out to nurse up to the 25th June,		
... ...		713
ıter parents	145	
rents	104	
e Workhouse and gone to service	136	
ırkhouse to go to service ...	14	
ont Deaf and Dumb Institution	1	
... ...	26	
rded-out	207	
		713

number of those 713 were puny, half-starved, tures, some were not more than a week old, deserted by their mothers, and found in the streets by the policemen, some so wretched-looking that the pauper nurses in the Workhouse refused to take charge of them. By the careful selection of healthy nurses, living in the country, where the children could get plenty of wholesome food, fresh air, healthful exercise, with proper clothing, they became completely restored to health and strength, growing up to become strong robust men and women, able to earn their bread; in evidence of which the large number already adopted by their foster parents, and gone to situations, is the most convincing, while the very low rate of mortality proves beyond a question of doubt that these children can be saved from premature death by proper care and attention. Results of so gratifying a nature induce me to express the hope that efforts will be made to extend the Boarding-out system to all other pauper children wherever practicable, and that this law, which is administered with so much success in Scotland, be extended to England and Ireland. WM. D'ESTERRE PARKER.

Passage West, Cork, Oct. 30, 1881.

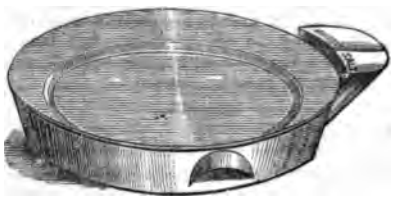
SANITARY INVENTIONS.

ŒTTLI'S MILK FOOD (LEHMANN AND CO.)

We have had this food extensively tried both in private practice and elsewhere, and are enabled to speak in high terms of it. It is a really excellent preparation, highly digestible and nutritive, skilfully prepared, easy to use, and extremely valuable for the nutrition of infants. It contains the elements of muscle and bone growth, besides the merely carbonaceous and saccharinal material which predominates in excess in various kinds of farinas, much, but unwisely, recommended for use.

IMPROVED HOT-WATER PLATE.

Hot-water plates are most useful articles, yet objections have been urged more or less against nearly all that have appeared, from some little apparent defect in their construction. The one here illustrated is the invention of Messrs. Groom and Co., Liquorpond Street, and appears to combine all the necessary features that is possible in such an appliance. It is made of the best blocked tin, and has a wide mouth for filling, which can be effected without fear of spilling, can be seen when full, and can be rapidly accomplished. The spout has an indented cover

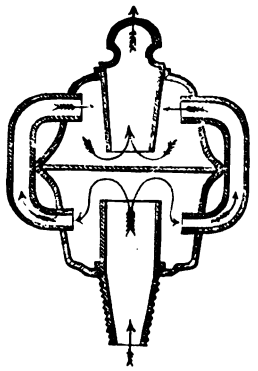


with a division formed in it, which may be used for condiments, the 'bed' is of such a form that an ordinary dinner-plate will rest upon it without moving about; and provided that the water is poured in at a good heat, it will be sufficient to keep the viands hot during the whole course of dinner.

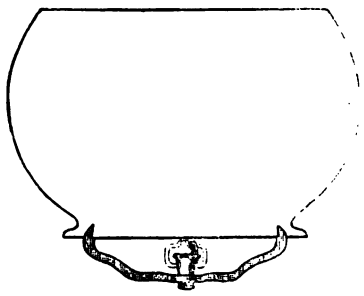
IMPROVED GAS BURNERS AND GLOBES.

Our attention has been directed to a new gas burner, called the A C Illuminator, invented by Mr. J. F. Clarke, 49, Moorgate Street, E.C. The advantage claimed for this burner is that it gives increased light with a decreased consumption of gas, and Mr. Clarke's contention is that his invention supersedes the so-called 'Governor' burners, which after a time cannot be relied upon; and one great advantage certainly is that there is no interior mechanism, or anything to get displaced or injured. No extra pressure of gas is required to work it, so that on foggy days

when the pressure is always weakest, a good light may always be relied upon. Our drawings represent a sectional view of the 'Illuminator', showing by means of arrows the



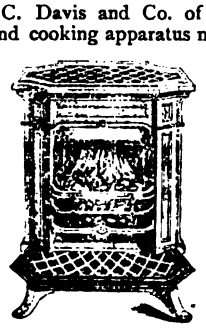
passage of the gas through it from the time it enters from the pipe, until it issues at the point of combustion. It will be observed that it has to traverse a circuitous route, and becomes heated in its passage; and to its more perfect state of combustion before it is ignited, must be attributed its high illuminating power. Some highly satisfactory tests have been made against other burners with it, and with a pressure of five-tenths it has burnt only 4.30 feet per hour, giving a light equal to 10.10 candles, and when the pressure was increased to ten-tenths, the results were 6.85 feet per hour, with an illuminating power of 14.30 candles, burnt with the accompanying globe as a shade, and it is neces-



sary for obtaining the best results from the 'Illuminator' that the two should always accompany each other. We are now writing by the aid of them, after making a few experiments in connection with other burners, and a more satisfactory light we have never used.

THE 'KYRLE' GAS AND COKE FIRE.

This is the second stove that has come before our notice, in which the name of that popular society, the 'Kyrle', has been used for a denomination. It is manufactured by Messrs. H. and C. Davis and Co. of Camberwell, the noted gas-stove and cooking apparatus manufacturers, and



is designed somewhat upon the lines introduced by Professor Siemens, the intention being to provide a smokeless fire burning coke, with the assistance of gas as a ligh medium, thus doing away with all the trouble of light and the expense of wood, etc. The burner is carried al the inside of the bottom bar of the grate, and is practic out of sight. All that is necessary is to light the bur when the coke soon becomes ignited. The gas can the turned down, and by this means the heat and brightnes the fire can be regulated at pleasure. Poking or stir the fire is quite unnecessary, and the small quantity of c burned, and the little dust made is remarkable. Ha fire-brick sides, and a solid sloping bottom, with a hea chamber underneath, fed by fresh air from the back, w is constantly being admitted into the apartment, the given off is very great, when worked to its full po Although shown here as an independent stove, the Sie fire can be fitted at little expense to an ordinary reg grate. Another new feature in the productions of the s firm is a small, but (for its size) powerful copper circu ing boiler, named the 'Sphinx'. Why Messrs. Davis sh have selected the name of a monster for their *petite* boi except as a paradox, we do not know. It is but ab 18 ins. high, but by the ingenious mode employed in c

ducting the gas through it, it is capable, supposing a tank was placed above it, of heating twenty gallons of water in forty minutes to boiling point, a most successful accomplishment. It is, therefore, admirably adapted for houses that are not supplied with hot-water apparatus, or the means of heating large bodies of water. It may also be used as an independent heater in large establishments, as an ordinary boiler for heating water for baths, or for circulating pipes for conservatories, etc. For the latter purpose, the smallest size is capable of heating 40 ft. of 2 in. pipe; and, for a copper boiler, it is probably the lowest in price in the trade.

NATIVE GUANO.

For the last five years the "Native Guano Company, Limited," have been dealing effectually with the entire sewage of the town of Aylesbury, manufacturing a valuable inodorous manure, which has been used in various parts of the country with success, and returning an effluent water, sufficiently pure for fish to live in, back to the streams. Many of our readers are cognisant of the Company, and their process; but it is hardly so extensively known as it deserves. It goes far to solve one of the most vexed problems sanitarians have to deal with, and it may be extended largely to the evident benefit of the health of the population, and gain in a monetary sense also.

The process of the Native Guano Company is that called the A.B.C. process, from the constituents employed, namely, alumina, blood, and charcoal, and its effects. To those who are desirous of making themselves conversant with the entire question of the disposal of sewage in a concise and practical form, and of the advantages of precipitating it as by the A.B.C. process, we cannot do better than suggest the perusal of a pamphlet on "The Profitable Disposing of Sewage," by Wm. Crookes, Esq., F.R.S., read before the Congrès International d'Hygiene et de Sauvetage, held at Brussels in October, 1876. The system of defecating sewage by precipitating the solid constituents, and rendering the filtrate or effluent water sufficiently pure

streams, is one which is generally ap-
e other methods are palpably unsuitable.
erience speaks strongly in its favour,
tom of the Native Guano Company for
e years to have an annual exhibition at
produce grown with the assistance of
this year it took place on the 26th
owever speaking of the display of fruits,
reals, it will be well to describe the
opted by the Company in preparing their
e sewage of the town is collected into
ich is brought direct to the works, and
open narrow canal. Immediately at its
e open it is attacked by an admixture of
d clay, mixed with water, which is ad-
pipe, in the form of a creamy black
Flowing slowly onwards, the sulphate
rtly afterwards introduced in a clear
water, and the whole is then admitted
1 two, of not very large dimensions,
ulation of the whole sewage of the town.
tion takes place, and all the solid and
to held in solution is sent to the bottom.
s now carried forward through a series
id eventually discharged into the nearest
he clearness of the water at its point of
idened out, and paved with white glazed
, and is said to retain only about 0,070
minoid ammonia (0.0490 per gallon),
ed how decidedly this falls within the
er gallon) proposed by the late Rivers
e. As before mentioned, this water is
to fish, and at the recent Fisheries
t Norwich, was the subject of some
ents, the water having been sent from
urpose. A silver medal and prize of
o the Company on that occasion. Ex-
Mr. Wanklyn and others at the works,
of the water viewed from this point
licating that the quantity of impurity it
es less than the standard laid down by
on Commission. The solid, or semi-
pitated in the tanks is collected, and
oir, from which it is allowed to run
orizontal presses. It contains in this
mount of water. Pressure by means
correctly speaking, a plate), and
1, is now applied, and the water runs
at the lower part of the sides of the
prepared for its reception, whence it is
ls. The interior arrangements of the
1 series of cakes, of a black inodorous
t resembling oil cake in size and thick-
which, being afterwards dried or baked
e "native guano" of which we speak.
ocess is the invention of Mr. W. C.
Directors of the Company. Mr. Sillar
ked on the day of the show, 'the Com-
ated, and that successfully, that, by the
layed before you, the requirements of
e disposal of all matters of annoyance.
its of the rivers are met by the restora-
eir waters freed from towns pollution,
ements of the country are met by the
immediate neighbourhoods of suitable
'.
f produce was exceedingly good, and
icter. It had been sent from various
1, and had been grown with the assist-
no' only. From hot-house grapes to
1 wide range, yet there were few vege-
east, or fruits in season, that were not
y cases, the growers were present also,
erms of the manure. It must be re-
in no instance has it been specially
ular crops. It is the same always.
advantageous to study this question,
such chemical constituents as it is
known are healthy, stimulating, or nutritive to certain crops, the Company have not studied. So for it has proved universally applicable, and has given general satisfaction. As to whether there could be found a market for this manure, if our sewage in general was treated in this manner, the officials of the Company express little doubt that all that could be produced would be readily sold; and if the system be very extensively adopted it could be made at a much less cost than it now is, which price, however, bears favourably in comparison with other manures, and is much less than foreign guano. Another and important feature in favour of developing this system is that, by utilising our towns' sewage in such a manner, we should be keeping in the country the large amount of capital that is annually sent to foreign countries for what we have at our own doors. To those interested in the question, few more interesting days can be spent than a visit to the Native Guano Company's works at Aylesbury.

NOTICES OF MEETINGS.

STATISTICAL SOCIETY.

The Monthly Meetings are fixed for the Session 1881-82 on the third Tuesday in the months of November-June. The Chair will be taken at 7.45 o'clock p.m., precisely. Tuesdays, Nov. 15; Dec. 20; Jan. 17; Feb. 21; March 21; April 18; May 16; June 20. The General Anniversary Meeting will be held on the 27th June, 1882, at 4 p.m.

The Council have reason to expect that in the course of the Session the following Papers will, among others, be communicated to the Society:—The President's Opening Address. (To be delivered in November.) By James Caird, Esq., C.B., F.R.S.—'The Industrial Resources of Ireland.' By George P. Bevan, Esq., J.P.—'The Comparative Taxation of the Principal European Countries.' By Robert Giffen, Esq.—'The Economic Progress of Italy, during the last twenty years, since the Establishment of the Italian Kingdom.' By Professor Leone Levi, LL.D. —'The English Poor Rate since 1859; a sequel to the Paper read in 1860.' By Frederick Purdy, Esq.—'Tonnage Statistics of the decade 1870-80; a sequel to two previous Papers on the decades 1850-60 and 1860-70.' By John Glover, Esq.—'The Relative Mortality of Large and Small Hospitals; their advantages and disadvantages considered.' By Henry C. Burdett, Esq.—'Two hundred and fifty years of Small-Pox in England.' By William A. Guy, Esq., M.D., F.R.C.P., F.R.S.—'The Relations of the English-speaking populations.' By Hyde Clarke, Esq.—'The Tenth Census of the United States of America.' By Frederic J. Mouat, Esq., M.D., F.R.C.S. Visitors may attend the Monthly Meetings, on the introduction of a Fellow.

SANITARY INSTITUTE OF GREAT BRITAIN.

At a meeting of the Sanitary Institute of Great Britain, held October 27th, Prof. F. S. B. F. De Chaumont, M.D., F.R.S., in the chair, the Secretary read a list of the donations to the Library since last meeting. Dr. John Eaton, Dr. Septimus Gibbon, and Mr. E. C. Robins, F.R.I.B.A., were duly elected Fellows of the Institute. Two Members were also elected, and seven applications read for ballot at the next meeting.

The ordinary meetings for the reading of papers and discussion upon sanitary matters will commence on December 7, when the Wyatt Edgell Prize of £200 for an essay on "The Range of Hereditary Tendencies in Health and Disease" will be awarded. Subsequent meetings will be held on the second Wednesdays in February, March and April. The chair will be taken at 7.45. Annual General Meeting, May 17th, at 4 p.m. Anniversary Meeting, July 13th, at 3 p.m. The Congress and Exhibition will be held in the autumn at Newcastle-on-Tyne. Examinations for Local Surveyors and Inspectors of Nuisances will be held Thursday and Friday, June 8th and 9th, 1882, Thursday and Friday, November 2nd and 3rd, 1882.

ILLUSTRATED SANITARY PATENTS.

4008. (1880) STEAM APPARATUS FOR WARMING AND VENTILATING HOUSES: GEO. JENNINGS, WESTMINSTER. [6d.]—This invention has for its object improvements in apparatus for warming and ventilating houses, carriages, and structures of any kind by means of steam, and the apparatus employed is somewhat similar to a tubular steam boiler or condenser set upon end, with the tubes standing vertically. Steam is applied to the interior of the shell casing, and heats the tubes which pass up it. A current of fresh air enters the tubes, and the heat causes the air to stream upwards through the pipes, being heated as it traverses them. Fig. 1 is a half-side view and a half-vertical

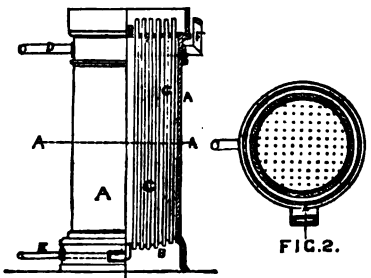


FIG. 1.

FIG.2.

section, and Fig. 2 is a cross section of the apparatus. It can be fed with steam from any steam boiler below itself. By employing steam heating apparatus, such as this, for supplying warmed fresh air to any part of a large building, a main steam pipe would be led from the steam boiler throughout the building, and branch pipes would be led from this main steam pipe to each steam heating apparatus. A cock should be provided on each branch pipe, so that whenever any one or other of the heating apparatus is not required to be used, steam may be shut off from this apparatus by closing the tap on the branch steam pipe leading to it. In this way any of the rooms or passages of a large building may at any time be kept warm, whilst others of the rooms of passages not then required to be warmed may be left unwarmed, and this is effected by the simple opening or closing of taps to admit or cut off steam from the various rooms of the building. Also if the main steam pipe which conveys steam to the various parts of the building is suitably covered, there will be comparatively little condensation of steam in the pipes, and the steam can thus be conveyed to long distances from the steam boiler, so that however far away any part of a building may be from the boiler, such part can be heated and ventilated just as easily as any other part of the building which may be nearer to the steam boiler, whereas if a building is warmed by the circulation of hot water there is great difficulty in so arranging it that each of the several rooms can be warmed or left unwarmed as desired; and in large buildings also there is great difficulty in keeping up the requisite circulation of the water, so that in some cases it has even been necessary to employ a pumping engine to maintain the circulation. The system is applicable to any building, however large or small.

644. (1881.) APPARATUS FOR HEATING, LIGHTING, COOLING AND VENTILATING: G. E. PRITCHETT, BISHOP'S STORTFORD, HERTS. [6d.]—This is a modification of his patent No. 1613 (1880), and the present one also applies to lighting and also heating by oil, gas, or other sources of light and heat. Fig. 1 is an elevation; Fig. 2 a vertical section; and Fig. 3 a plan in section of one form of this improved heater. This invention refers more particularly, although not solely, to appliances for heating, ventilating, medical, and sanitary purposes. Also for lighting, as distinguished from his apparatus of doubled plates and tubes, being supplied with heat from a distance or near. The doubled plates, tubes, etc., may, however, be actuated and heated singly instead of in pa may be made portable if need be. Also the may flow and return from their lower edges o necessarily using their sides and tops for that pu this present invention he can obtain a better e

FIG. 1

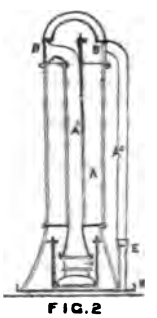


FIG.2

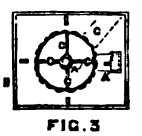
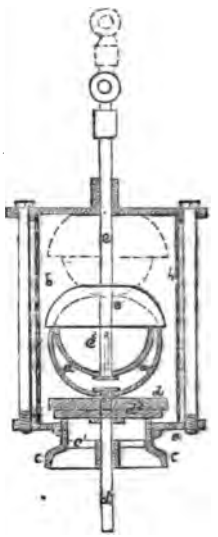


FIG.3

of temperature, also economy in the tubing as usually requisite for flow and return arrangemen plates and tubes may be in multiple form and have flanges, etc., containing fluids or steam for incre heating surfaces of such appliances. To carry of ducts of combustion, flues may be supplied and and by regulating the admission of air to them an of heat a more perfect and economical combustio and improved ventilation can be effected. Whe provements are applied for cooling, the cooling passed through the apparatus, cooling the air in it and promoting ventilation.

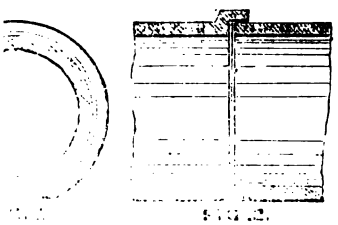
778. (1881.) APPARATUS FOR PREVENTING OF WATER: E. O. MUNDY, STRATFORD, ESS invention relates to improvements in water w venters. Hitherto apparatus designed for the p open to certain objections; by working the



peatedly the water is allowed to pass until the other receptacle is emptied, but by the adaptio improved apparatus only a specified quantity of allowed to pass, and a lapse of about a minute is before it can be again properly manipulated.

a vertical section of a valve and apparatus ling to this invention. Such improved ap- s of a hollow ball of rubber, etc., working a guide, with a covering or cage of metal, any kind of chip, straw, or refuse coming the working parts, which at times enter he orifice in the base plate is provided with so as to allow of its screwing on to a metal is soldered into the cistern or other place ratus is fitted, and thus allow of its removal . The piston works up and down, and is n by means of a guide tube, which latter a bridge piece formed in the seating; top end of this guide tube is a brass disc or h any suitable non-corrosive metallic com- to impart sufficient weight thereto when ff the water. The piston is provided with l hemispheres, the top one being fixed to bottom one being loose gradually presses til it has descended and shut off the water, having the appearance of a cup rubber. ratus it is less likely of any straw or fibre eating, thus preventing the shutting off the rotected by a casing of perforated zinc; ldditional full flush of water cannot be ob- out a minute's duration: and, thirdly, the e is made so large that it is not likely to is prevent the free action of the water waste vill in other valves of the kind.

SOCKET PIPES FOR SEWERS AND DRAINS. C.E., DEWSBURY, YORKSHIRE.—This in- in constructing a socket pipe, so that when are laid in position, the bottoms or beds of the inverts of same shall be in one and the ne. Fig 1 shows a cross section of pipe tion of socket; it will be seen that the invert of pipe is considerably more than n of pipe, and that the bottom or bed is



ows a longitudinal section by which it will constructs the socket. The drawings show the invention as applicable to a pipe of es internal diameter, but the same prin- cable to pipes of any other internal dimen- antages claimed are: 1st. A perfectly even 2nd. a perfectly even invert; 3rd. the incumbent weight is equally distributed pipe; 4th. the extra thickness of pipe and tear occurs, viz., on the invert. The de in fire-clay, stoneware, concrete, or any

IMPROVEMENTS IN TROUGH OR MUL- CLOSETS. H. BOWES SCOTT AND H. V. TMINSTER. [4d.]—This invention relates ltiple water-closets such as are employed in where a number of persons have to be ac- one time. For this purpose under a number they fix a trough having one of its ends ing weir, beyond which is a suitable trap in or sewer. This trough when in use is r to the level of the weir, and this water creta from the seats above. At suitable of water is discharged into the end of the rom the weir, and this water rushing along es it, carrying the excreta or the principal part of them over the weir to the drain or sewer. The flushing may be effected automatically. The weir also may be provided with a siphon so arranged that when an addition is made to the contents of the trough sufficient to start the action of the siphon, the trough will be rapidly

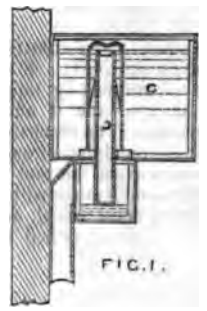


FIG.2.

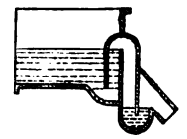
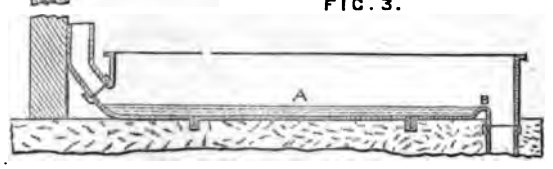


FIG. 3.



emptied by it, and fresh water can then be run into the trough. The drawing represents a trough or multiple closet arranged according to this invention. Fig. 1 is a longitudinal, and Fig. 2 a transverse section; A is the trough, which may be of any suitable length. It is made with a weir B at one end so as to retain a certain depth of water in the trough; C is a tank provided with a flushing siphon D.

1047. (1881.) DRAIN TRAPS. C. S. ROLFE, C.E., WESTMINSTER. [4d.]—This invention relates to improvements in traps for preventing the efflux of gases from drains, whereby the outside air can freely enter the drain without destroying the seal of the trap, and in the event of pressure arising in the drain an increased depth of seal is produced to oppose it, whilst a large freeway is provided

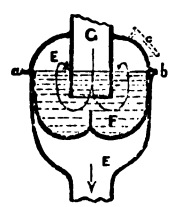


FIG 1.

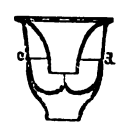


FIG 3

FIG.4

FIG.2.

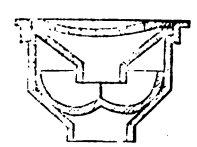


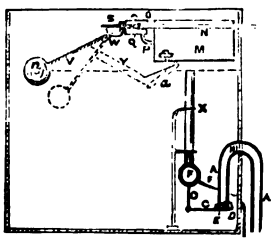
FIG. 5.

for the passage of solid substances. In the drawing, Fig 1 represents an arrangement of stench trap for water-closets, urinals, and the like; E is a casing, having fixed therein a dish or receptacle F. The inlet G dips for a distance (which distance represents the depth of the seal) below the edge of the dish. In some cases I find it advantageous to vary the form of the casing, and to make the basin of the form shown in Fig. 2. The dotted lines, Fig. 1, show a clearing out opening. A lip may be placed on the sides of the basin, and rather lower where the overflow takes

place. Fig. 2 represents his improvement as applied to sink traps, and Fig. 3 is a sectional plan of the same at *c*, *d*. Fig. 10 represents a suitable form of his improved trap as applied to gullies.

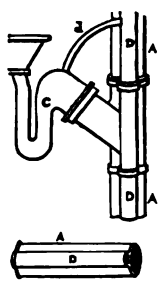
AMERICAN PATENTS.

242,970. DISINFECTANT AND AUTOMATIC FLUSHING TANK: JAMES J. POWERS, BROOKLYN, N.Y. Filed April 8, 1881. *Brief.*—The supply of disinfecting liquid into its tank, and thence into the sewage tank is automatically controlled by a float mechanism. The discharge of the disinfected sewage is automatically regulated through a hollow float controlled valve, which covers the end of the discharge siphon. *Claim* 1.—The combination with a sewage liquid-collecting tank of a disinfectant vessel, and automatically operating devices substantially described for



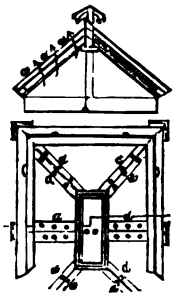
discharging the contents of this disinfectant vessel into the tank. 2. The combination with a sewage liquid-collecting tank of a discharge siphon of a disinfectant vessel, and of an automatically operating device substantially described for discharging the contents of this disinfectant vessel into the tank. 3. In an automatic flush tank the combination with the siphon tube A, of the valve E, the lever C, and the float F, provided with an extension J, and a discharge tube F^1. 4. In a disinfecting and automatic flush tank, the combination with the vessel M, the supply pipe N, the valve Q, the lever V, acting on the valve Q, float X, the casing O, the chain or equivalent Y, the lever Z, and the valve I. 5. In a disinfecting and automatic flush-tank the combination with the vessel M, the supply pipe N, the valve Q, the slotted valve stem S, the spring R, the cam U, the lever V, and the valve I. 6. The combination with an automatic and disinfecting flush-tank of the syphon A, the valve E, the lever C, the float F provided, with an extension J and a discharge tube F^1, the vessel M, the pipe N, the casing O, the pipe P, the valve Q, the lever Y acting on this valve, the float X, the lever Z, and the valve I.

244,000. WASTE PIPE AND FITTINGS: THOMAS C. TOWNSEND, NEW YORK, N.Y. Filed December 10, 1880 (no model). Issued July 5, 1881. *Claim.*—The combina-



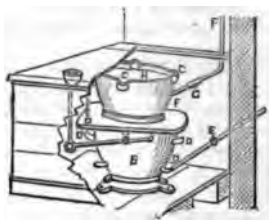
tion with sections D on waste pipe, sections A of a trap C, connected with said sections D by a pipe *b*, as shown and described.

244,136. SKYLIGHT: IVAN M. LUTZ, PHILADELPHIA, PA. Filed March 16, 1881. Issued July 12, 1881. *Brief.*—The under side of the hollow inclined skylight bars is perforated, the bars communicating with a top ventilator shaft. *Claim*—A skylight having a frame consisting of base bars and hollow upwardly-inclined bars, and provided with a hollow top shaft, each of the upwardly-inclined bars



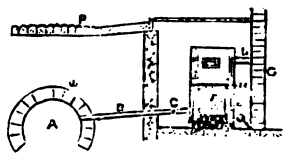
being provided with a series of openings, a^1, a^1, a^1, which open into the apartment, and with an upper end opening, a^{11}, which communicates with said shaft substantially as set forth.

244,219. WATER-CLOSET AND BIDET BOWL: JOHN HANAGAN, NEUBURG, N.Y., assignor of one half to James C. Griggs, same place. Filed April 13, 1881. Issued July 12, 1881. *Claim*—1. A water-closet and bidet bowl constructed with recesses in its rim, substantially as herein



shown and described, to allow the hand to be introduced for bidet purposes as set forth. 2. In a water closet and bidet bowl, the trunk B constructed substantially as herein shown and described, with embossments D upon the opposite sides of its lower and upper parts, to receive the inlet and outlet air pipes E F, whereby the said trunk is ventilated as set forth. 3. In a water-closet and bidet bowl, the combination with the outlet air pipe F of the T branch G, substantially shown and described, whereby the space below the water-closet is ventilated as set forth.

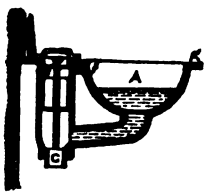
244,907. APPARATUS FOR PURIFYING SEWERS, ETC.: F. B. LIPPENCOTT, ATLANTIC CITY, N.J. Filed Sept. 4, 1880. (Model.) Issued July 26, 1881. *Claim*—1. The herein-described method for the purification of sewers, etc., consisting in passing the gases arising therefrom in small jets or streams into a fire or flame arising from said fire, whereby said gases are brought to intimate contact with a



proportionally greater quantity of heat, thereby insuring the perfect combustion of the impure sewer gas. 2. In an apparatus for burning noxious gases, etc., the combination of an inner perforated shell F, an outer shell Q, an unobstructed annular space E, a fire box located within shell F, provided with means for producing combustion or sustaining a fire, an inlet pipe B in communication with the sewer A and annular space E, which may be provided with a valve and an exit pipe J, in communication with the combustion chamber or fire box. 3. In apparatus for burning noxious gases, etc., the inner perforated shell F, the outer shell Q, the unobstructed annular space E, in communication with the sewer A, in combination with a combustion chamber located within shell F, and an exit flue

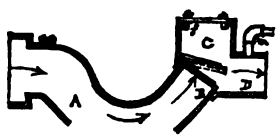
aid combustion chamber. 4. In apparatus for burn-
xious gases, etc., the shell F, provided with conical
res K, the smaller openings of said apertures being
d the interior of said shell in combination with a
stion chamber located within said shell F, said
res being the exit from a cavity about said shell,
is in communication with the sewer or drain by a
le pipe.

,718. WASH BASIN: CHARLES H. MOORE,
ERS, N.Y. Filed September 16, 1878. Issued
, 1881. *Claim*—1. The slab A^1, having one or
ports in it to secure the faucets, the bowl A, and the
er B, extending vertically downwards from the slab
l the valve-seat, all made in one piece, as and for the
e set forth. 2. In combination with a water-basin
slab, having one or more ports in it to secure the
, a chamber formed with the slab, and extending



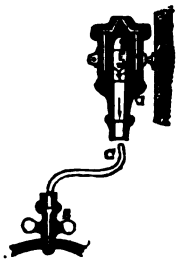
ally downwards toward the valve-seat. 3. In com-
on, a water-basin, the rim or top surface of which is
l square, and having a strainer secured in the bottom,
chamber formed with the basin or rim, and extending
he rim or margin of the basin downwards towards the
eat. 4. In combination, a water-basin having an
ndent or separate strainer fitted in it, and the
er B, formed with the basin, and having an in-
dent valve-seat secured to the bottom. 5. In the
chamber of a water-basin an independent valve-seat
in the bottom, and having a shank extending through
ttom, and secured by means of a lock-nut, as and for
rpose set forth. 6. In combination with a water-
and the outlet-chamber of said basin, and a float
ing in the outlet-chamber, the channel *f*, as and for
rpose set forth. 7. In combination, the slab A^1
one or more ports to secure the faucets, the basin A,
ssage C, and the outlet-chamber B, extending vertic-
ownward from the slab towards the valve-seat, all
in one piece, substantially as shown. 8. A basin
provided with a soap dish, in combination with a
chamber and a valve-spindle, said spindle working
h an opening in the soap dish.

425. SEWER-TRAP: WILLIAM BENDELL, NEW
, N.Y. Filed March 26, 1880. Issued July 19, 1881.
—The combination of the branch pipe or passage *m*,



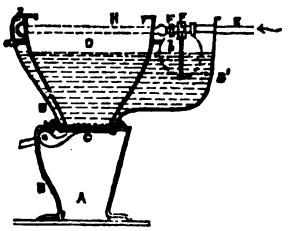
tlet pipe D, the body A, having the inclined valve B,
e valve-chest C, constructed with the opening *f*, all
ıtially as and for the purpose herein set forth.

468. AIR-VENT OR INLET FOR PLUMBER'S TRAPS:
AM MCELROY, BROOKLYN, N.Y. Filed Dec. 1,
Issued July 19, 1881. *Claim*—1. A vent-valve for
nd similar purposes, having a stem made from elastic
g material, whereby the valve is permitted to lift
s seat by the lateral bending of the said stem, and is
p to its seat by the elastic tendency of the stem to
its normal position or shape. 2. A vent-valve for
nd similar uses, having a hollow, tubular, or globular
ade from elastic yielding material, whereby the said
s permitted to lift from its seat by the lateral bulging
ding outwards of the sides of the stem, and is held up
eat by the elastic tendency of the sides of the hollow
stem to assume their normal position or shape. 3. The
combination of the casing D, the cover *c*, containing the
valve-seat, the cap *e*, flanged to take over the casing, and



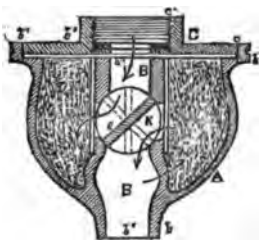
the valve E. 4. The combination of the casing D, the
seated cover *c*, the elastic cap *e*, and the hollow tubular-
stemmed valve E, provided with perforations *h*. 5. The
combination, with the trap, of the screw-plug or nipple B,
the tube C, the casing D, the seated cover *c*, the elastic
cap *e*, and the valve E, all arranged to operate substanti-
ally as set forth.

244,535. WATER-CLOSET: WILLIAM BLACKWOOD, JR.,
DETROIT, MICH. Filed April 8, 1881. Issued July 16,
1881. *Claim*—1. The outer bowl or case B, provided
with lugs *a*, in combination with the ring *b*, and the taper-



ing inner bowl D, fitting within said ring, substantially as
and for the purpose specified. 2. In a water-closet, and
in combination with the outer case B, lugs *a*, and ring *b*,
the inner bowl D, provided with the curved channel *d*, and
the curved water-pipe H.

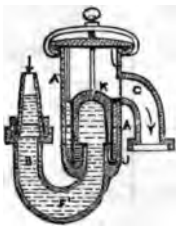
244,701. FILTER: PARKER-WELLS, LYNN, MASS.
Filed May 18, 1881. (Model.) Issued July 19, 1881.
Claim—1. A filter having a body, an exit-neck, and a
contained rectangular frame of form described, cast in one
piece, to form a filtering-chamber and a valve-chamber,
having side apertures connecting therewith, and being pro-
vided with a removable top, having connections for attach-
ment to the source of supply, adapted to serve with a



three-way valve, as specified. 2. The body A, neck *b*,
threaded flange b^3, and rectangular frame B, cast in one
piece, as shown, combined with the perforated disk I and
cap C, as and for the purpose set forth. 3. The combina-
tion of the body A, *b*, b^1, b^3, and frame B, cast in one piece
to form filtering-chamber D and valve-chamber H, *h*, the
screens X, disk *i*, cap C, c^1, and the three-way valve, as and
for the puspose set forth. 4. The valve K, composed of
the central plate *k*, heads k^1, k^3, shank k^4, and handle k^5,
combined with nut *m*, and casting A B *b*, having threaded
apertures b^6, as set forth. 5. The valve K, having head
k^1 cut away to form a segmental space, k^2, combined with

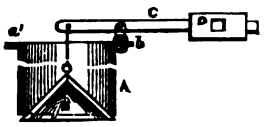
the body having pin x^1 to limit the stroke of the valve, as specified.

245,011. TRAP FOR WASH-BASINS: ANDREW W. NICHOLSON, BROOKLYN, N.Y. Filed September 29, 1880. Issued August 2, 1881. *Claim.*—The trap A, the inlet



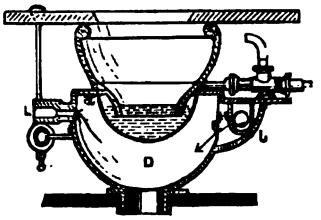
pipe B, the outlet pipe C, the inverted cup K, in combination with the quicksilver seal J, and the water seal F^1 and L, substantially as shown.

245,140. SEWER-TRAP: ABRAHAM CUMMINGS, PHILADELPHIA, PA., assignor of one-half to Joseph Donnelly, same place. Filed February 12, 1880. Issued August 2, 1881. *Claim.*—The improved sewer-trap, consisting of the imperforate cylinder A, provided with a top rim a^1, the ears *b*, rising from and fixed to said top rim, and the lever C,



fulcrumed to said ears *b*, and carrying at one end the centrally-suspended valve B, and at the other end the adjustable weight D, the top suspending rim thus supporting the ears, lever, and connected parts, and said lever and weight being above the cylinder, all parts being constructed, combined, and operating as set forth.

245,193. WATER-CLOSET: JOHN MCGUIRE, MILWAUKEE, WIS. Filed May 16, 1881. (No model.)



Issued August 2, 1881. *Claim*—1. In a water-closet, the basin D, having drip-openings H, in combination with a ball and cage, as set forth. 2. In a water-closet, the basin D, chamber J, cage F, air inlet H, and valve controlling the same, in combination with pipe L, substantially as shown and described.

At a meeting of the Lower Thames Valley Main Sewerage Board, held at Kingston, under the presidency of Sir Thomas Nelson, a letter was read from the Local Government Board on the subject of the terms upon which the West Kent Main Sewerage Board were willing to arrange for the discharge into their sewers of sewage from the Lower Thames Valley district, stating its inability to accede to the proposals of the West Kent Board. The Board thought the difficulties would best be met by an arrangement which would admit of the discharge of the sewage of the district into the West Kent system, and suggested steps being taken to bring about a conference between the two authorities to revert to the original proposal. After a long discussion, the feeling of the meeting was expressed, 'that it was not desirable to further consider the matter'.

NOTES AND QUERIES.

Having for some time back been in the receipt of Que taining strictly to sanitary work, and which it would be eas without having to refer our correspondent to competent p advisers, we have opened a column in which to register such Q Replies thereto as can fairly be expected from us; and our and readers are invited to make such use of this column a to benefit themselves and the community. Both Queries an will be subjected, if unnecessarily long, to a strict curtailment,

1. VENTILATION OF SOIL-PIPES AND TRAPS.

Will any of your readers inform me when soil-pipes and tra first to be ventilated at all, and when ventilated full diamet how the necessity for ventilation was made manifest? R

[There can be no question that the ventilation of the soil found necessary because of the discovery by some hand practice checked syphonage. Perhaps the trap was first v and when it was found that the ventilation of the soil-pipe for all the closets led into it, the latter was practised. A v soil-pipe some thirty years old can be seen in a South Ke house, but up to late years the ventilator for the soil-pipe w piece of gas-pipe in very many instances, simply to prevent age. The idea of a pipe ventilated the full sectional area enough, not over fifteen years old.]

2. TESTINGS OF VENTILATION OF BUILDINGS BY COWLS AN

Can you inform me what results have been arrived at by t missioners of the Sanitary Institute of Great Britain, with r the Ventilation of Buildings by Cowls and Pipes? F.

[We understand that no Report has yet been published gentlemen, and that they have as yet devoted their att testing in the most careful and scientific manner the anem of commerce, and those specially constructed according to t designs. We are told that none of the current-meters yet u results agreeing with the registration as corrected by th issued with them by the makers, despite the most careful com used by them in the building erected by them at Kew various Gas Holders put at their service. Without a most basis to work from, it would certainly not be satisfactory testing ventilators; and the first thing therefore is to obta basis. We only trust that these gentlemen will see fit to a report upon the whole of their work done hitherto,—t the result,—as it must prove of great benefit to thorough And in the meantime each one interested should send a gra Cowl Committee of the Institute, 9, Conduit Street, Oxfo W., in order that they may obtain, when it is issued, volume of the Report.]

3. SYSTEMS OF SEWAGE.

Is there any publication which gives the details of the va systems of sewage introduced in our towns and cities? Es

[Harbingers of the various new schemes, or improvem ones, will be found in the SANITARY RECORD from its mencement in 1874, but we cannot quote in full engineerit As nearly every Municipal and Sanitary Engineer is a the Association bearing that name, better consult the 'Pr of the A. M. and S. E.' from Vol. I, published in 1875, present time.]

4. CONTINENTAL PATENTS.

I am glad to see that you give your readers an illustrated the Sanitary Patents in England and the United Stat you not extend the boon to a *resumé*, very generally, of the newest ideas on the Continent? ENGINEE

[The woodcuts are somewhat expensive, and we do no trifles, but we think that we must wait a little before we incur translations from so many. Patents on sanitary m issued regularly from at least fourteen European States. see what we can do by perhaps a quarterly or half-yearly

5. CHOICE OF CLOSETS.

What water-closet, not of the 'Pan Order', is the best f use?

[We cannot undertake to print answers to such invidious

6. IS A 'DAMPNESS' LEGALLY A NUISANCE INJURIOUS TO

I have an impression that somewhere I have read a decisi damp house, although reported by a Medical Officer as to health, does not come within the intention of the Publ Act, sect. 91, § 1. The Clerk to one of my Boards has impression, but we cannot find the ruling or case in quest you help us? I may say, by the way, that if such a decisio appears to me at variance with a common sense reading tion referred to, which defines the meaning of the word there used simply as 'injurious to Health'. There are c my districts, not merely damp, but positively wet from roo ment, which even a month's east wind fails to dry; and if mises are not 'in such a state as to be injurious to health', is a wretched cripple. M

[Probably our correspondent has in his mind the case *Western Railway* v. *Bishop*, in which it was decided water dripping through a bridge was not a 'nuisance' 'Sanitary Acts'. That decision seems to cover the state alluded to in our correspondent's letter; in other words, he legal redress for what is certainly, in the common acceptat words, 'a nuisance injurious to health'.]

IGINAL PAPERS.

SEWER AIR.

SPEAR, Inspector, Local Government
. Board, etc., etc.

nts of air in sewers is the subject of communication presented by Professor o the Bavarian Royal Academy of ıe Professor, as is well known, has done lasting service to the cause of sanitary ıis inquiries concerning the relation ıd air and water, and the prevalence of : inquiries, valuable not only in them- the stimulus and direction they have observations; and his views upon this subjects are worthy at all times of the ion and respect. Attracted, he tells us, prevailing belief, that sewer-air may be contagious matter, especially of con- yphoid fever, which have their principal estines, he, with the object of putting the test, induced his friend Dr. Von of Buda-Pesth, to carry out certain regarding the behaviour of the air ers of Munich. Having regard to the ıese experiments as thus stated, their esult, it must be confessed, are not a little . The statement that has been made ɔ epidemics of fever in certain English pecially (so says Professor Pettenkofer) o the typhoid epidemic at Croydon in greater prevalence of the disease in the l quarters of these towns is attributable ɔy of sewer air to travel to the higher ver system, is adverted to as occupying position, if not indeed as one sus- ıcial test in the major subjects, and, by ıe ascertained movements of air in the s, subjected to adverse criticism. But ions, it will be seen, barely touch the larger question proposed—the potency s a bearer of disease-germs; while, as ore limited one, it is obvious that the ınd to be developed in one sewer can worthy criterion of those prevailing in fferent calibre, gradient, and circum- ilation. Nevertheless, the explanation l to of the occasional greater prevalence e higher parts of a town, has, it has often been advanced on insufficient while it is undoubtedly true that some ll calibre, steep gradient, and defective ıy act at times as shafts for the passage ıed air, so that concentration in the ıy to an extent be brought about, yet ion is wholly exceptional; and the in- Dr. Von Rozsahegyi, if containing little tely new, will yet do good service in esson of caution to observers of epi- e, as insisting upon the necessity, d phenomena are ascribed to the effects currents, of determining the actual ıch currents by direct observation.

h experiments were carried out on the Louis and Maximilian suburbs, and of ıter-house, during the summer months, ɔerature of the sewers averaged from 'er than that of the open air. Various ːs—the mixed fumes of ammonia and acid, the fume of a burning cigar saturated with tincture of benzoin, and large quantities of sulphuretted hydrogen gas—were developed in different parts of the sewers, and at several of the sewer openings in streets and houses, for the purpose of ascertaining the direction and velocity of the air-currents; and the *italic* anemometer of Recknagel was used to determine the force of these latter. The conclusions arrived at may be stated briefly as follows: (1) Air-currents within these sewers are prevailingly downwards, that is to say, in the direction of the flow of the sewage; that such currents (their direction and force) are apparently determined by the sewage stream; and thus it happens but very seldom, and then for very short distances, that the draught is in the stream; (2) that these currents are stronger in the lower and deeper-laid sections of the sewers; (3) that the prevailing direction and force of the wind in the open air have little appreciable influence on the direction and velocity of the sewer air-currents, nor do differences of temperature explain in any considerable degree the movements of air observed; (4) that by the mouths of house and street drains, air passes more frequently outwards than inwards, but the direction at one and the same time at adjacent openings may vary, so that the air of different houses and courts situated near each other, and communicating with the same drain may, by this channel, in the absence of efficient trapping, be directly co-mingled.

These observations, confirmatory of many similar ones made in England, can throw, we repeat, no doubt upon the validity of that general belief in the potency of sewer air as a bearer of infectious matter. We should have been surprised had the result been otherwise. The mass of circumstantial evidence that has been collected, all tending to confirm the belief above expressed is enormous; and we know by actual observation that sewer air is largely impregnated with particles, larger and heavier, probably, than those which constitute the contagia of disease. Whether such particles are raised into the air of the sewers by the ascensional power of the watery vapour, or given off as dust from the alternately wet and dry sewer walls, or projected into the air by the bursting of the bubbles of decomposition, may be to some extent a matter of conjecture; but of their actual existence, and of the possibility of their conveyance by gentle currents for long distances, actual observation, as has been said, leaves no room for doubt.

The adoption of appropriate measures for preventing the invasion of dwellings by the germ-laden air of the sewers is becoming in this country day by day more general. In an interesting report recently presented to the Greenock Board of Police, we find Mr. Turnbull, C.E., describing the methods of sewer ventilation adopted in thirty-three large towns from which he had obtained special information. In thirty of the thirty-three towns free and open ventilation in the streets is practised; and in three cases only, as regards the towns of Ipswich, West Hartlepool and Gateshead, where the streets are narrow and confined, and the sewers themselves probably defective, is any doubt expressed as to the thorough efficiency and innocuousness of the system. Such, indeed, is now the teaching of abundant experience. Elaborate systems of ventilation, whether by exhaust shafts, or by special outlets and inlets, or by other means, are not necessary; nor are they found in any case to answer their full purpose; but, by the abundant provision of free and direct openings, communicating with the open air at points not in too immediate proximity to houses, sewers, by the numerous

natural forces at work between them, will ventilate themselves.

Equally marked has been the improvement of late years in our method of construction of house drainage—a matter no less important in this connection than that of free ventilation of the sewers. The model bye-laws issued by the Local Government Board for the guidance of Sanitary Authorities, are, in this matter of construction of house-drainage, almost perfect. Great benefit has, we understand, already followed their adoption in various towns ; and we can do no better service than strongly recommend their general acceptance by Sanitary Authorities and their strict enforcement.

ON WATER ANALYSES FOR SANITARY PURPOSES.

By THE REV. J. H. TIMINS, M.A. Trin. Coll. Camb., F.G.S.,
Student of St. Thomas's Hospital, London; Analyst for Wrotham Urban District.

IN an article in the SANITARY RECORD of July last it was justly observed that 'the most practicable test of the quantity of organic impurity in water is that of the determination of the chlorides and albuminoid ammonia, combined with a careful inquiry into possible sources of contamination, and especially a careful search for the remains of previous contamination in the form of nitrates and nitrites.' Certainly nothing less than this ought to be held to be sufficient for the proper examination of water for sanitary purposes; but these necessary requirements are not always fully satisfied.

In some rural districts no quantitative analysis is considered necessary unless with a view to legal prosecutions, and the only examination of suspected water is made by testing it with permanganate of potass; and even when a quantitative analysis is made, no attention is ordinarily given to the question of previous contamination by the determination of the inorganic nitrogen; and I have met with instances in which water liable to pollution to an extent which was dangerous to health, and which had apparently led to the development or dissemination of typhoid fever, has been regarded as organically safe, because only a moderate amount of albuminoid ammonia had been evolved from the organic matter contained in the sample of water analysed; although the amount of previous contamination had been so considerable that, if it had been properly determined, it would have given timely warning of danger. This may be easily proved by examples given in the following table:—

Parts per 100,000.

	Date.	Chlorine.	Free Ammonia.	Albuminoid Ammonia.	Previous Sewage or Animal Contamination.
1 *a*	Aug. 17, 1881 ..	2.08	0 00	0.007	12,860
b	Aug. 30.....	2.57	0.00	0.043	13,610
2 *a*	May 11, 1881 ..	4.14	0.004	0.006	16,430
b	May 25.....	3.57	0.002	0.013	16,110
c	June 9	3.86	0.001	0.002	17,780
d	Oct. 13	3.29	0.003	0.025	25,129
3 *a*	Dec. 8, 1880....	4.71	0.00	0.006	13,390
b	March 10, 1881	3.14	0.001	0.025	3,920
4 *a*	Jan. 11, 1881 ..	7.72	0.003	0.016	7,890
b	Feb. 16.....	8.28	0.001	0.038	32,970
c	Aug. 4	8.00	0.001	0.005	24,510
5 *a*	Jan. 31, 1881 ..	5.57	0.00	0.013	29,700
b	March 14	5.86	0.001	0.005	21,580
c	Sept. 19	4.73	0.00	0.002	6,378
6	Sept. 29, 1881 ..	2.83	0.00	0.021	9,645
7	Oct. 7, 1881....	4.28	0.002	0.027	17,896
8	Aug. 30, 1881 ..	6.57	0.001	0.0195	23,200

The previous sewage contamination is according to Dr. Frankland's standard i London sewage. Thus, 100,000 lbs. of the had been polluted with an amount of anim equal to that contained in 12,860 lbs. o London sewage.

I received the sample (1 *a*) on the 17th and had to report the water organically called attention to the amount of previou nation, 12,860, and recommended a furth after a short interval. This was made a afterwards, when the chlorine had increase and the albuminoid ammonia by 0.036 p the water having passed from an appar into a highly dangerous state. The we feet deep, and the hardness of the water case of No. 2 was similar. When an the 11th of May it was free from seriou impurity. But the previous pollution, 16,4 for further examination, which was made a later, when the albuminoid ammonia was doubled (2 *b*). A fortnight afterwards it examined, when, as regarded present po was quite pure (2 *c*). But the previous cont 17,780, showed liability to sewage pollu when examined five months later, it pro a decidedly dangerous water (2 *d*). So, in case on the list, the water was apparently cepting that the previous contamination, 13 warning of danger (3 *a*); and when next it was obviously unfit for use as a drinki (3 *b*). Again, the sample (4 *c*) would be pr very good water if it were not for the prev tamination, 24,510; but at other times it bad (4 *a*, *b*). The well was 60 feet deep, in the hardness of the water 20.5. The next (5 *b*) was pure as regarded recent polluti (5 *c*) was exceptionally pure; but the prev tamination, 21,580 in the first, and 6,37 other, indicated liability to sewage pollu when the filtering power was overtaxed, pollution became apparent (5 *a*). The wel feet deep, in gravelly clay and Kentish rag hardness of the water 27. These example sufficient to show the great importance of t mination of the inorganic nitrogen in an water for sanitary purposes, and the of the danger which may result from n it. Some remarks of Professor Wanklyn treatise on Water Analysis, may perhaps b as justifying the omission. He says that the afford no data of any value in judging organic quality of water, because they find into it from the various geological strata trav the water, as well as by oxidation of the refuse discharged into it. But all risk of e this source may be obviated by the analys himself thoroughly acquainted with the phy chemical geology of the district.

I have referred to the practice of many officers of relying on permanganate of pot test of the probable degree of pollution of organic matter. It is doubtless not intended as a final test, but as a convenient mode of the cost of unnecessary analyses; but it is by some Rural Sanitary Authorities as suffi all ordinary purposes. It is therefore nec call particular attention to the danger of the The reduction of the permanganate of p water may be accelerated or impeded by circumstances besides the presence or ab organic matter, that reliance upon it may le

ondemnation of pure water, or to the approval nically dangerous water. As to the former, owing experiment will be sufficient evidence: sample of well water of known impurity, con- sufficient organic matter to evolve from 0.02 parts per 100,000 of albuminoid ammonia, h little free ammonia. Distil some of it off e distillate ceases to give any evidence of the e of ammonia under Nessler's test. Then f a further quantity of 50 c.c. into a cylinder, ce it by the side of another cylinder contain- same quantity of the well water, and test them ith equal portions of a solution of perman- of potass, which will be reduced quickly, ly, or scarcely at all in the well water, but instantaneously in the distillate. The result be that the dangerously polluted well water be pronounced bad, middling, or good, ac- to appearances; and the distilled water be condemned absolutely as quite unfit for purposes. But the mistake of reporting us water as safe is a still more serious especially as it effectually puts a stop to all inquiry on the part of the Sanitary Authority. point I must refer again to the analytical ven above. I will begin with a case in which rmanganate test was successfully applied, been quickly reduced, and analysis (8) proved er to be impure. In another case (7), where as still more organic pollution, the test was successful, the permanganate having been , but more slowly; but in the others in which was tried, (1 *b*) and (2 *d*), in which the quantity nic matter evolved as albuminoid ammonia ater than in (8), and in (1 *b*), in which it was an twice as large, and which was from a well a family suffering from typhoid fever at the hen the sample was taken, there was no t reduction of the permanganate.

ne accurate knowledge of the condition of water is often a matter of life and death, it ot to be made dependent on any such un- ests, nor on any analyses which do not include tion as to the liability of the water to animal nation, by the quantitative determination of ic nitrogen, as well as its actual pollution by rmination of present organic impurity; and he water under investigation contains any ed matters, they must be examined under the ope. It can be of little importance to ascer- ether a sample of water appears cloudy or en viewed through a two-foot tube, unless we w the nature of the substances—inorganic or animal or vegetable—by which the cloudiness n caused; and by means of the microscope often enabled to obtain evidence of contami- and important information as to its nature bable source, which chemical analysis alone il to supply. Thus, fibrous tissue in all its sually abounds in water which has undergone pollution. It is quite insoluble in water, and utrefaction for a long time; and it is carried to wells to a depth of a hundred feet or more undergoing any change by oxidation. It t necessarily make water containing it un- me, especially as it is sometimes derived from worse than the insoluble debris of soup meat. ontains as much nitrogen, and would therefore water as bad a character as the same amount en. On the other hand, water may be polluted ances, from which, as being less in quantity, uminoid ammonia would be evolved, but which are far more dangerous; such as solid cor- puscles and epithelial scales of mucus, epithelium derived from exfoliation of the mucous membranes of the intestines and air passages, urinary deposits consequent upon desquamation after eruptive fevers, corpuscles of pus and fat, which last, as it contains no nitrogen, cannot affect the amount of albuminoid ammonia. All such organic matter should be care- fully observed and studied whenever the analysis of water is required for sanitary purposes, especially when it is undertaken, as it usually is, in consequence of the occurrence of zymotic disease in the vicinity of the suspected water; its examination then becomes a matter of too great importance to admit of the disregard of any available means of promptly detect- ing any organic impurity by which such diseases may possibly be disseminated.

I must here observe that the usual process of determining albuminoid ammonia does not always give accurate results; for insoluble animal matter may pass over into the cylinders during the first distillation for the determination of the free am- monia, as may be ascertained by the microscopic examination of the distillate; and the amount of the albuminoid ammonia, as subsequently determined, will be proportionally under-estimated. If, as is too commonly the case, the whole question as to the approval or condemnation of water is made to turn on the evolution, from the organic matter contained in it, of a few parts more or less, per hundred million, of albuminoid ammonia, all such risk of inaccuracy in determining its amount ought to be avoided.

REPORT
ON
THE ABATEMENT OF SMOKE;
*And on the Proceedings adopted by the Smoke Abatement Committee of the National Health and Kyrle Societies.**

By ERNEST HART, Esq.,
Chairman of the Committee, and Chairman of Council of the National Health Society.

THE origin of this Committee is described as fol- lows in the report of the National Health Society of January 1881. The subject of the abatement of smoke, with the view of purifying the atmosphere of London, and lessening the deleterious character of London fogs, has been vigorously taken up by the Society during the past year. In the spring of 1880 the subject was brought under the notice of the Committee by Mr. Ernest Hart, the Chairman of Council, as one which he was desirous of taking up actively with the co-operation of the Committee, and he was requested to take steps to bring the question into a practical form for further proceeding. With this view, Mr. Hart placed himself in commu- nication with Professor Chandler Roberts, F.R.S., Professor of Metallurgy at the School of Mines, and Chemist to the Mint, who undertook to make an examination of existing methods of combustion of coal in household grates and in furnaces. Further steps were taken to obtain details of the existing apparatus in use in different parts of the kingdom; of various fuels; and a considerable collection of documents was made, which have been placed at the disposal of the Committee subsequently formed. In July, Mr. Hart learned from Miss Octavia Hill,

* Read at the opening of the Smoke Abatement Exhibition at South Kensington, on Wednesday, November 30th.

the Treasurer of the Kyrle Society, that that Society was contemplating some action in the like direction, and it was arranged between Miss Hill and Mr. Hart that, with the approval of the respective Societies, a Joint Committee should be formed, with the object of continuing the movement. Such a Committee was accordingly nominated, and met at the Society's rooms; a definite course of proceeding was resolved on, and a programme was sketched out. Various eminent persons known to be specially informed on the subject (not all connected with either Society) were asked to join the Committee.

The first proceeding of the Committee was to communicate with colliery owners and manufacturers of heating apparatus as to the means available for the reduction of smoke, and next with the Metropolitan parochial authorities and public bodies, directing their attention to the serious and increasing evil, and asking their co-operation in abating it.

The Committee next proceeded to obtain a report on the existing state of the law in regard to smoke, and on the machinery for bringing it into action, which is published as a preface to the Catalogue.

The first thing to keep in mind is that there is no law prohibiting the production of smoke for household purposes, except so far as a particular chimney or fire may, by reason of the smoke, become a nuisance to one or more individuals. Such cases might arise and be dealt with under the ordinary law of nuisance, as in the case of obstruction to lights, and so forth; but there is no Act of Parliament dealing with domestic fireplaces. There is, however, a considerable body of enactments restraining the diffusion of smoke or other vapours, where those vapours are produced in any operation of business or trade. These it may be desirable at a later period to strengthen and to extend.

The Committee next proceeded to confer with the manufacturers, bakers, and others who come under the provisions of the Smoke Act. For this purpose, a public meeting was convened at the Cannon Street Hotel. At this meeting, resolutions were carried approving the action taken by the National Health and Kyrle Societies, in regard to the appointment of a Committee and an assistant Sub-Committee of Experts to inquire into and take measures necessary to effect the reduction of smoke in and about the Metropolis, and pledge themselves to support the action of the said Societies; also approving the course proposed to be adopted by the Committee appointed by the National Health and Kyrle Societies in regard to making and encouraging public trials of various descriptions of smokeless coal and fuel and appliances for lessening the production of smoke.

In order to invite broad consideration of the subject, to elicit public opinion, to encourage improvements in heating and smoke-preventing appliances, and to diffuse a knowledge of their use, the Committee then appointed a deputation to wait upon the Lord Mayor, and ask him to convene a public meeting at the Mansion House on the subject, which he consented to do; and a meeting was accordingly held under His Lordship's presidency. Among other resolutions, the following was proposed by the Right Hon. G. J. Shaw-Lefevre, M.P., First Commissioner of Works, and carried unanimously: 'That this meeting is further of opinion that the injurious effects of fog are largely due to the quantities of smoke given forth from the chimneys of furnaces, manufactories, and steam vessels, as well as dwelling-houses, and that the smoke in the Metropolis might, without any considerable difficulty, be greatly lessened by the better enforcement of the existing law, by the introduction of amended legislation, and by the general use, in all descriptions of premises, including dwelling-places, of proper smoke-preventing apparatus, of improved household stoves and grates, or of smokeless fuel.' The late Dean of Westminster; Sir U. K. Shuttleworth; Mr. Spottiswoode, the President of the Royal Society; and Mr. Burton, Keeper of the National Gallery, were among the speakers.

Shortly afterwards, at a public meeting held by the Kyrle Society, the President, H.R.H. the Duke of Albany, referred with warm approval to this movement as part of the Society's work, and a resolution in support of it was passed by the meeting.

On Tuesday, July 26th, a largely-attended meeting was held at Grosvenor House, by permission of the Duke of Westminster, President of the National Health Society, at which H.R.H. the Princess Louise, Marchioness of Lorne, was present, when high scientific and medical evidence was borne by Dr. Siemens, F.R.S.; Sir Henry Thompson; Dr. Quain, F.R.S.; and Mr. Spencer Wells, to the scientific importance and reasonableness, and the hygienic value, of the objects in view.

The Committee proceeded to complete arrangements, by the permission of Her Majesty's Commissioners for the Exhibition of 1851, the Lords of the Committee of Council on Education, and of the Council of the Royal Horticultural Society, for the Exhibition to be held in the buildings erected for the International Exhibition of 1862, of improved fire-grates, furnaces, kitcheners, cooking, warming, and other apparatus of all kinds, devised to prevent smoke or to consume smokeless fuel; the Exhibition to include varieties of bituminous and anthracite or smokeless coal, and special fuel for household fires and furnaces. In the catalogue, the various exhibits will be found classified and arranged under sections. Arrangements were also made for the fitting-up of some buildings for the purpose of testing the efficiency of grates, stoves, and other appliances suited for domestic use; and trials of various fuels and boiler appliances were also provided in the Exhibition Buildings and in the Royal Albert Hall, and at certain factories in which facilities were offered by the proprietors. It was resolved that the testing of apparatus should be made as far as possible under the following conditions:—

TRIALS OF APPARATUS AND FUELS.

1. Domestic heating appliances—viz., grates, stoves, and kitcheners, and kitchen open ranges—should be tested for heating power, cost, convenience, quality of combustion, and their comparative freedom from smoke and noxious vapours. Various fuels and new appliances for the utilisation of anthracite and other smokeless coals to be tried. Gas-heating apparatus, in which great improvements have recently been made, to be tested and compared.

2. In regard to the testing of furnaces and apparatus for industrial purposes a greater difficulty presents itself; but trials of some of the more recent improvements in boiler apparatus were to be made with the special object of testing the combustion of fuel and the prevention of smoke, having regard also to evaporative performance.

The Committee engaged the services of Mr. D. Kinnear Clark, M.Inst.C.E., to superintend the trials, under the direction of the Executive Committee. Professor W. Chandler Roberts, F.R.S., has drawn up a scheme for the chemical testing in connection with the trials of fuel, grates, and stoves.

ee have felt—and have been con-
by very numerous expressions of
ult of extended correspondence with
rience representing all classes in
ovinces, and abroad—that such an
testing, carried out under the
ommittee of Experts, would be of

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may be) constructed, without producing

the Committee to examine the subject
port, for public information, upon the
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reliable information upon which to base
able amendments of the existing laws

the Committee to ascertain and make
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or the purpose of heating, and generally
the available material for determining
ay be prevented, and testing numerous
of which are very little known.

s have been offered by Dr. Siemens,
Manchester, and by a committee of
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rtificates of Honour, will be awarded
the Judges.

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fuels, and the trials carried on, will
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f the most successful and useful of
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heating, without unnecessary pro-
e. The Committee hope, also, that
will prove of advantage to the
have incurred considerable labour
bringing their exhibits before the
y recommended by the Committee.

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ne, in a letter to a contemporary on the
ts, recommends as the most effective
cheapest, costing less than one farthing
tion of chloride of lead, so strongly
the late Dr. Goolden, of St. Thomas's
most simple, the most powerful and
for eliminating sulphide of hydrogen
ere, as well as from all organic matter
composition or putridity. It is pre-
f a drachm of nitrate of lead, dissolved
boiling water, to be mixed in a pail of
drachms of common salt have been dis-
ipped in the solution and hung up in any
odours prevail will sweeten the fœtid at-
neously, or thrown down a sink, water-
r over a heap of refuse, will produce a

on, who has been appointed the Sanitary
erbury, has been presented with a gold
locket by his former colleagues on the
The presentation took place at the
the Board, and was made, on behalf of
by Mr. Mitchell, the Chief Sanitary
y all the staff of the Board subscribed,
ical Officer and the Chief Engineer.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

X.—LAMBETH WATER-FILTERS.

WHEN I say that Messrs. Doulton manufacture upwards of seventy shapes and sizes of filters, including every kind now in use, at prices varying from 2s. 6d. to £9, and that they have generally received the approbation of many eminent chemists during the last thirty years, the reader can form some idea of the magnitude of this branch of their sanitary productions.

The simplest kind of filter, which we need mention, of their manufacture is the pocket and syphon filters. These consist of carbon blocks, on the immersion of which in any pond or stream, pure water can be drawn by suction through a flexible tube which is attached to them. Both the pocket and syphon filters are fitted with japanned cases, and the pocket filter has a cord attached to it, whereby it can be strung over the shoulder after the manner of an opera-glass.

Sometimes the carbon block is used as a syphon, and is so placed in a vessel as to allow the tube to overhang the side with the outlet below the level of the bottom of the vessel in which the block is placed. To start it, it is only necessary to draw the air by suction out of the tube, and the action of supply of pure water is continuous when once set in work.

Syphon Filter and Case.

It is easy to imagine how valuable such filters are to travellers and to the army, when it is their misfortune to pass through neighbourhoods in which no pure water can be obtained, and if such a safeguard had been generally in use, much sickness and death might have been avoided. Nothing could exceed the cleanliness of the articles, the filtering material being made of Patent Manganous Carbon, joined to tube of pure india-rubber by means of a small piece of stoneware, and fitted with suitable bone mouth-pieces.

It may be said that with our present supplies of water in the Metropolis, and in large towns especially, that it is most essential, after withdrawing water from the cistern or main, to filter it at all events into a stoneware water filter, so as to obtain increased purity. And nothing is more common in well equipped households, than to find these articles placed upon stands in the basement or in the nursery, and fed either by hand or by taps situated above them. In this class of filter a sponge is contained in the upper plate, and it is only necessary to wash the sponge carefully once a week. The larger filters of this description may be had with or without covers,

and are made in sizes, competent to purify, up to seventy gallons per day. They may also be had on the ascension principle, with taps either in brass or stoneware. For ships uses, reasonably large filters of this description are sold with basketted casings to resist breakage.

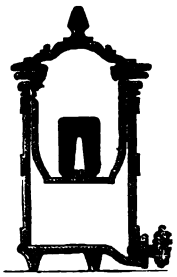
This kind of filter is also made with most ornamental exteriors, both in stoneware or Doulton ware, with suitable covers; and so far has the art of ornamenting these articles gone, that they can be purchased either shaped like a pillar, suitable for a classic hall, or got up in elaborate gothic style for churches and vestries. Filter stands of various designs are also supplied when such an addition is required, and drip-pans provided to rest under the taps, one of which, showing a clam shell supported on a tortoise, is very tasteful.

Vase H Filter, purifying twenty gallons per day (with cover).

Messrs. Doulton also supply the cistern-filters known as the London General Water Purifying Company's filters, which are charged solely with animal charcoal. The water passes, when drawn, by ascension through a syphon pipe. The filter is placed at the bottom of the cistern, and the apparatus is made flatter than usual, when it has to be placed in a shallow cistern. They are made to supply water for drinking purposes only, or large enough to filter all the water used in the household for all purposes.

It would serve no useful purpose to enter upon all the many patterns of filters extant at Messrs. Doulton's works, but there is a patent filter for the purification of drinking-water which must not be overlooked, and this is the manganous carbon filter, in which the filtering material was patented by Professor Bernays, F.C.S. This filtering material is composed of manganese bin-oxide, mixed with specially prepared charcoal, thus bringing the water to be filtered into contact with much more powerful oxidising media than would otherwise be the case. The material is compressed into the form of a block, and the silt which becomes deposited upon it from time to time is easily removable by brushing it off in water, whereupon the filter is restored to its original efficiency.

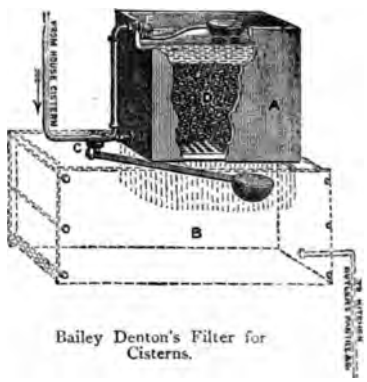
This filter is made either in brown or enamelled stoneware, and the block inside is screw tight fashion, but in such a manner as g a speedy removal and replacement of the t ensures an easy separation of its parts fo poses of examination and cleansing. No used in these filters, it being a highly scien bination. So much so can this be said, necessity of oxidation by the air is here re and the direct exposure of the block to the water in the chamber lowers, permits of a re air-oxidation. An extra block is recomm order to ensure a more perfect aëration by or bi-weekly changing of the block.



Section of Doulton's (Dr. Bernay's) Manganous Carbon

A very important class of filter manufact the Lambeth Works is the Automatic Self-Su Aërated Filter of Mr. Bailey Denton, C.E.

In this filter, all water used for potable pur self-supplied to the filter, and when a certain q of water is withdrawn, a corresponding qua



Bailey Denton's Filter for Cisterns.

A.—Filter. B.—Receiving tank for filtered water, made in slate or other material. C.—Ball valve for supplying water from House-Cistern. D.—Filtering material. E.—valve for preventing the admission of water at a greater r will filter. FF.—Bearers supporting filter on top of receivi

admitted into the filter from the main, or f house store-cistern. The complete aëratio filtering materials is achieved here also, and tion is secured by an alternate substitution o water in the mass. The filtering material sl renewed or cleansed about twice a year. N can prevent the automatic action of this filte is constructed in suitable sizes to render from five to two hundred gallons per hour.

A new kind of filter has recently been int which is made self-filling by means of a ba The article has two compartments: one, in the unfiltered water flows from the house-ta partition or division between the compartmen made of the patent manganous carbon, which the water filters into the second cham vided for the storage of the filtered wate

vided with two taps, one on the un-
or ordinary purposes supply, and one for
ater. It is also supplied complete with
x on the wall, and with a zinc cover. It
o be used as an indoor filter directly
ntrol of the purchaser.

o on further to explain these filters and
others, for instance the Table Filters in
r Doulton ware, but will conclude by
ll the classes of filters can be seen at
mbankment Show Rooms, or studied in
e catalogues.

THE

TARY RECORD.

DECEMBER 15, 1881.

will be glad to receive, with a view to
n, announcements of meetings, reports of
gs, and abstracts or originals of papers
e the members of any sanitary or kindred
n.

L-POX HOSPITALS AND SMALL-POX.

in a recent Report, replies to the state-
ned in the memorial of the Sanitary
f the Hackney Board of Works, "that
there had been a marked increase in
of small-pox cases in the immediate
he Small-pox Hospital in the past, as
th the previous, ten years, therefore this
in some way due to the Hospital. He
by pointing out the fundamental error of
he years 1861-70, which were relatively
e years, with the years 1871-80, in which
ee epidemics of 1871, 1876, and 1880.
e says, was known by many persons to
in the vicinity of the Hospital long
le patient was admitted within its walls.
ntion to the fact that from September
til February 8, 1880, the Hospital re
ed, being reopened because small-pox
ie vicinity of the Hospital, from which
to infer that 'small-pox has an affinity
ity of the Homerton Small-pox Hos-
irrespective of the latter'.

points out that 'small-pox during the
s was on the increase generally, and in
f the Hackney district outside the influ-
Hospital'; and draws attention to the
striking immunity of certain of the City
Union inmates from small-pox, when
ore exposed to small-pox from a Small-
l, both by proximity and otherwise, than
ss in the vicinity of the Hospital'.

rmary of the City of London Union at
he observes, 'stands at a distance of
om the westmost block of the Homerton Fever Hospital, and in this block, upon two occasions, for a period of four months each, there were forty small-pox beds constantly occupied. The windows directly face each other, and are almost always open. Here then, apparently, are the conditions for the passage of the small-pox poison, if it be true that it may be carried long distances through the air. Amongst a number of persons, consisting of children, new-born infants, and young women in confinement, there were likely to have been some susceptible subjects. The poison was there, and not only in the block referred to, but in certain winds it would be blown from three similar blocks, which are parallel to it. Thus, air liable to contamination by about 250 small-patients might, on two different occasions, for a period of about four months, have passed into rooms inhabited by persons, some of whom were probably susceptible to its influence, and yet on neither of these occasions did a single case of small-pox arise in the Union Infirmary; and although scarlet fever has been treated in the same block for nine years, with the small-pox exceptions referred to, no single case of scarlet fever has arisen in the lying-in wards of the Infirmary or in the children's dormitories.'

The experience of the Homerton Training College, and the Associated Practising School, both in the immediate vicinity of the Hospital, and past which ambulances and visitors went, was of the same kind. The students of the College and the scholars in the schools are reported to have been singularly free from small-pox. Here then, observes Dr. Collie, are important exceptions which he thinks should not have been passed over without remark; an omission he regards as an indication 'that their Memorial has not been carefully considered'. He then quotes facts to show that it was not special to that vicinity as would be supposed from the contention of the Committee. Thus, in the vicinity of the Victoria Park Station, a mile distant from the Hospital, in 1861-70 there were six small-pox deaths, whereas, in the years 1871-80 there were 77, or more than twelve times the number. Other localities within short distances of the Hospital are quoted, with the same result. At Clarence Road, Clapton, a side road through which neither ambulances nor visitors passed to the Hospital, and wholly free of any hospital influence, in the years 1861-70 there was one death, whereas in the years 1871-80 there were eight, or eight times the number.

Looking at the memorial, says Dr. Collie, from this general point of view, the contention of the memorialists might be said to be that when small-pox is epidemic everywhere the vicinity of the Hospital should be an exception—a self-evident absurdity. Facts are quoted to show that the absolute increase has been actually less than in the outside districts quoted. Dr. Collie says he has not the material for treating the Hackney memorial exhaustively, for which purpose it would be necessary (*a*) to take into account the general sanitary condition, together with

the recent census; (*b*) the actual pauperism; (*c*) the vaccination; (*d*) the condition of the population, as to immigration, etc., etc.

Dr. Collie next proceeds to deal with Dr. Tripe's statement which forms the premiss upon which the conclusions of the Committee are founded, a statement, he observes, which consists in comparing districts which were, and still are, small-pox haunts with districts which were not, and are not yet, such places, and in concluding that because a small-pox hospital exists in the former, therefore the hospital is the cause of the increased incidence of small-pox in the one district as compared with the other. 'It will require no argument,' he says, 'to show that this method of procedure is wrong. There is no small-pox hospital in the vicinity of Victoria Park Station, of Palace Road, Duncan Road, Shacklewell Row, or Clarence Road, in some of which the recent incidence has been greater than in the streets immediately surrounding the Hospital.' Dr. Tripe, he thinks, might have maintained with reason that the Board Schools spread small-pox, because within the quarter-mile radius of each group of small-pox deaths marked on Dr. Tripe's maps there was a Board School.

Dr. Tripe's calculations, based upon the calculation of deaths, is, Dr. Collie observes (and brings forward tables to show) wholly fallacious; for unless, he says, the death-rate be the same in all the compared districts, calculations made upon it are necessarily misleading.

There are two other points which Dr. Collie deals with, viz., (*a*) the objection of the memorialists to the ambulances passing through College Lane, and (*b*) the alleged danger to visitors to the patients from the ambulances' momentary detention at the gates before the porter opens them. On the former point Dr. Collie observes, 'If the ambulances be a danger to the public, the shorter the route, and the less frequented, by which they travel to the Hospital the less the danger.' The memorialists, he says, whilst maintaining on the one hand that the ambulances are infectious, object to their passing through a short and unfrequented lane, and insist on their traversing crowded thoroughfares six times the length of College Lane, with, if their doctrine be true, the chances of infecting the public indefinitely multiplied. On the second point Dr. Collie asks:—'Whether it be seriously maintained that the visitor to the small-pox patient, the person who enters the small-pox ward and sits by the bedside of the small-pox sick, runs a real risk of contracting small-pox from an infrequent five seconds' chance contact with a closed ambulance—five seconds being the time it takes an ambulance to enter the gates.' Dr. Collie concludes by saying:—'Whilst, however, I do not believe the Homerton Small-pox Hospital to be a danger to the neighbourhood in which it is placed, or that the Hackney memorialists have made out their case, I am of opinion that, although not a danger, it may yet be an annoyance, and I would submit that the Managers might very properly consider if it be so, and whether the experience of last ten years suggests any means by which annoyance might be diminished or removed.'

NOTES OF THE MONTH.

THE BRIGHTON DOMESTIC AND SCIENTIFIC EXHIBITION.

THIS Exhibition opened simultaneously with the meeting of the Brighton Health Congress at this fashionable watering-place, on Monday evening, the 12th inst. The Earl of Chichester is President of the Exhibition and Dr. Richardson of the Health Congress. The former is being held, mainly, in a building composed of corrugated iron adjoining the Pavilion, which was erected in fifteen days by that popular *entrepreneur* of this class of erection, Mr. J. C. Humphreys, of Ludgate Circus. As a provincial collection it may claim to rank first with anything that has yet appeared out of London, and there are very few things connected with domestic economy or comfort that are not to be found within its walls. The more luxurious side of life is represented by sparkling and other wines (amongst which the firm of Max Greger and Co. figure prominently), liqueurs, and spirits, while the choice little epicurean dishes that emanate from the Brands and kindred manufacturers, are also to be found. Effervescing and non-alcoholic drinks are conspicuous; and a few of the prepared foods are shown, amongst which we noticed Messrs. Savory and Moore, and Lloyd's Universal Food. Pharmacy is not lagging behind here, and when we mention the names of Messrs. Corbyn, Stacey, and Co., Savory and Moore, Allen and Hanburys, Burroughs, Wellcome, and Co., and others, who in addition represent some of the popular transatlantic and other productions from foreign or colonial sources, it will be seen that the Exhibition is not badly represented in these channels. Amongst domestic appliances, washing machinery, cooking apparatus, both for gas and coal, heating stoves, invalid furniture, and numerous other appliances that help to make life the more enjoyable, are to be found rather extensively displayed, the local firms having taken advantage of the Exhibition to transfer a large portion of their stock from their show-rooms to the Pavilion annexe for the time being. We must, however, defer a descriptive notice of the display until our next number, as it only opened on the eve of the day on which we go to press, and when our columns were full to overcrowding with particulars of the Smoke Abatement Exhibition at South Kensington.

SEWAGE DISPOSAL AT WREXHAM.

An arbitration case is now proceeding at Wrexham, during which matters are being brought to light which are anything but comforting or reassuring to the inhabitants. The parties directly interested are Colonel Jones, and the Wrexham Town Council. Colonel Jones has been the lessee of the sewage farm at Wrexham since 1872, and agreed to take the sewage of the town. He now contends that the liquid sent on to his farm is not sewage, but sewage and water, and claims damages for alleged injury to the farm in consequence. The Corporation deny their liability, and contend that they are sending Colonel Jones what he agreed to take. The principal witness examined up to the present is Mr. Baldwin

who, in the course of his evidence
w some sewers being constructed in
uesday, not a single pipe of which
. It was an absolute waste of money
ers such as these. They not only
ater, but they let out sewage. The
xham was worn out. Particular out-
id fever had been traced to bad
as Wrexham has. Mr. Baldwin
remarked that the separate system
d be adopted in Wrexham for about
ost towns, owing to the favourable
ation of the place.

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t EPIDEMIC IN MARYLEBONE.

ly report, Mr. Wynter Blyth, the
of Health for Marylebone, refers to
ak of typhus fever in Charles Street,
nd points out the difficulty under
ary authorities are placed in such
can only proceed under Torrens'
h a medical officer may condemn
or human habitation, his report must
rveyor, and if that official says the
pable of repair, repaired they must
ouses in Charles Street were con-
rs ago, but the surveyor, on being
not say they were incapable of being
repairs were ordered. It was not
come so dilapidated that repair was
e that the order could be given for
That has now been done; but Mr.
will be a great mistake to suppose
ve an appreciable effect in staying
. The only way the outbreak would
ssfully grappled with at the outset
ng the inhabitants of the affected
hing and disinfecting establishment,
emselves as well as their clothes,
similar process to their rooms. But
lone under the law as it stands; yet
ed clothes and infected persons that
se. Some people may be prosecuted
ected clothing; but this can only be
ing them to a crowded court, where
ice may spread the epidemic further
been left alone. The only consola-
poison of typhus, being volatile, is
l by air and sun, and thus the danger
ets is not so great or permanent as
rlet fever or small-pox. The house-
inspection continues, and but little
ling' has been found, but it must be
t in this matter the inspector may be
has no power of entering any house
fter 6 p.m. Mr. Wynter Blyth is
w to his duties in the Metropolis,
cely have made the statement, he is
e done on this subject. The hour
6 o'clock, as being the limit after
tor cannot enter a house for inspec-
ply to a visit paid for the purpose
the number of inmates; besides
luring which an inspector can enter
ded under certain circumstances to
ur, viz., so long as the business is
ner medical officers of health have
lty in visiting houses occupied by
mily, at any hour, and have directed
to act in a similar manner. On
e is in error, viz., in assuming that
vestries and district boards have no power to destroy bedding and clothing, and replace them with new. This has been habitually done, as well as inspection during the evening and at night in several east-end parishes. The vestries can also provide 'houses of refuge' to which the inhabitants of infected houses can be taken whilst their rooms are being disinfected. The authority to enter and inspect houses let in lodgings, at any time, can be obtained under sect. 35 of the Sanitary Act, 1866. Perhaps, however, the Vestry of Marylebone has not made any 'regulations', and if so, the sooner they make them the better for their poorer inhabitants. Typhus has appeared in several parishes in London, chiefly in St. Pancras, Marylebone, and Whitechapel. The number of deaths registered from this cause is not very large, viz., 31 in the six weeks ending Nov. 26 against a corrected average of 23. There is, however, much doubt as to the correctness of the returns from this disease, as many metropolitan medical officers of health state that on investigating the reported deaths, they frequently find the death to have been caused by organic disease, such as pneumonia with severe irritative fever, and not from typhus.

SMALL-POX MORTALITY AT HOME AND IN HOSPITAL.

According to a contemporary, a statement of an extraordinary character was made at a recent meeting of the Liverpool Health Committee by the medical member of that Committee. "He said," reports our contemporary, "that during a recent small-pox epidemic in Liverpool, out of 1660 cases attended at their own homes, there were only 138 deaths, while out of 314 who were removed to hospital, 161 died. Even after making a liberal allowance for the more serious nature of the cases removed to hospital, the disproportion between a mortality of 51 per cent. in hospital, and 8½ per cent. at home, is excessive." This statement, if correctly reported, is of such serious import, and so contrary to the experience of small-pox elsewhere, that pending further information we postpone further comment.

SMALL-POX AND FEVER HOSPITAL ACCOMMODATION.

The Queen has issued a Commission appointing Baron Blachford, Sir James Paget, Sir Rutherford Alcock, Mr. Arthur Wellesley Peel, Mr. Edward Leigh Pemberton, Dr. John Burdon Sanderson, Dr. Alfred Carpenter, Dr. William Henry Broadbent, and Mr. Jonathan Hutchinson, a Commission to inquire respecting:—1. The nature, extent, and sufficiency of the hospital accommodation for small-pox and fever patients provided by the managers of the Metropolitan Asylums Board, and the several vestries and district boards in the metropolis, including the Commissioners of Sewers for the City of London. 2. The relative advantages and disadvantages to patients and the public of providing for small-pox and fever cases, whether amongst persons of the pauper class or persons of the non-pauper class without proper means of isolation, or both, by a limited number of hospitals for the whole metropolis, under one authority—such as the managers of the Metropolitan Asylum District—or by parochial and district hospitals, under vestries and district boards. 3. The expediency of continuing the several existing small-pox and fever hospitals now under the managers of the Metropolitan Asylum District; or, if it be con-

sidered desirable that any should be closed, the accommodation for small-pox and fever cases which should be substituted. 4. The expediency of the managers of the Metropolitan Asylum District establishing additional hospitals, and of making special provision for convalescent cases. 5. The conditions and limitations under which the hospitals provided by the managers should be continued, and the general conditions and limitations which should be observed in the case of the establishment of new hospitals, whether by the managers or any other authority, so as to ensure, as far as practicable, the recovery of the patients and the protection of the public against contagion. 6. The operation of the Acts relating to the establishment of hospitals for small-pox and fever patients in the metropolis, and the provisions, if any, required for the acquisition of sites for such hospitals, whether by agreement or otherwise; and for the protection of the authorities providing small-pox and fever hospitals, subject to the same being conducted with reasonable care, and according to prescribed regulations, from liability to legal proceedings, so as to secure the public against the loss of the benefits arising from such institutions; and to make such suggestions as they may deem expedient in connection with all or any of the matters aforesaid. Mr. Nathaniel Baker, barrister-at-law, is secretary to the Commission.

THE VALUE OF FEVER HOSPITALS.

Dr. Elliott, Medical Officer of Health for Carlisle, in a recent weekly report to his Authority, stated that there were at that time twenty-six patients in the fever hospital at Crozier Lodge (twenty-five scarlatina and one typhoid). Fourteen deaths had been registered during the week, not one of which was from any zymotic disease. The death-rate from all causes was equal to 20 per 1,000 per annum. In the corresponding week last year the death-rate from all causes was 28 per 1,000, and from zymotic causes 1.5 per 1,000 per annum. Since last New Year's Day, taking the cases of which the officials had got notice, there had been 129 cases of scarlet fever. Of these, 63 had been treated in the fever hospital at Crozier Lodge. Of these 63 not one was lost. Of the 66 cases which never came to Crozier Lodge—through stupidity, or ignorance, or concealment,—until removal was impracticable, the deaths were 25. Appended to the report was a letter, which had been sent by a lady, expressing gratitude for the kindness shown to her boy at the hospital while under treatment. It had been a great blessing to her to get him there, and she wished all parents could understand what an advantage is to be found in fever hospitals.

THE NOTIFICATION OF INFECTIOUS DISEASES.

Mr. John Leigh, Medical Officer of Health for Manchester, in his biennial Report for the years 1878-79, gives some valuable testimony in favour of the notification of infectious disease and likewise of the isolation of cases. He notes that a distinguished physician in Manchester expressed his surprise, soon after his appointment to the Manchester Infirmary, at the large number of children brought to him in the out-patients' room suffering from scarlet fever, and of the existence of which the parents who brought the children had no suspicion. Scarlet fever, so far as Mr. Leigh's observations have gone, appears to be more infectious in its latter than in its earlier stages, so that it is probable, if information of the cases could at once be obtained, even after the disease is fairly developed, and local hospitals were provided for the reception of the cases, the spread of the disease could be considerably checked. He is of opinion that nothing but isolation of the case, which can with difficulty be effected in any but large houses, can very materially reduce it. . . . . Previous affection does not always give immunity, as many persons will take the disease a second and even a third time. Whooping-cough, like scarlet fever, is often not detected in its early stages, and it is probable that but few cases would terminate fatally if the children affected could be received at an early stage into warm and well-ventilated rooms, in which they could be protected from the atmospheric conditions which produce bronchitis and pneumonia, to which the little patients under this disease are especially prone.' Mr. Leigh urges the provision of special hospitals and special wards for these cases. It appears from the Report that during the last three years 984 children have been killed by scarlet fever in Manchester, and 940 by whooping-cough, a total of 1,924 from these two diseases alone.

WATER FILTERS.

Another case has been added to the few recorded in which the spread of typhoid fever has been prevented by a reliable system of water purification. In a report by the Surgeon-General of the tenth (Prussian) Army Corps, dated September 17th, 1881, we read that a small epidemic of typhoid occurred twice in the military hospital at Emden (Hanover), first during the winter 1875-76, and again in 1877. The drinking water was contaminated by organic matter, and stated to have been the sole cause of the latter outbreak. In 1878, two of Bischof's spongy iron filters were obtained, and the Surgeon-General of the Corps reports that since their introduction no further epidemic of typhoid has taken place. The water, which previous to the use of the filters was flat and rather repugnant to the taste, has since been bright and palatable. The same results have been obtained in the military stations at Shoeburyness and Fort George. In the former, zymotic diseases, especially typhoid, were prevented, whilst very prevalent in the neighbourhood. In the latter, they were arrested, as will be seen by comparing the nineteenth and twentieth Army Medical Reports. The same filters were ordered in 1878 by the Prussian Military Administration, during a severe epidemic of typhoid fever, for Fort Alexander at Coblenz. Since the introduction of the filters not a single further case of typhoid occurred up to the commencement of the present year, when, the well having in the interval been deepened, the filtration through spongy iron was discontinued. It is remarkable that shortly after this another epidemic of typhoid should have broken out.

THE COST OF WORKING MEN'S DWELLINGS.

Messrs. Hine and Odgers, architects, of Plymouth, have written a letter to the *Building News* in which, replying to some difficulties which were said to stand in the way of providing good and cheap dwellings for the poor in populous neighbourhoods, they point to what has already been done in this direction in Plymouth. It was stated, amongst other things, that the cost of erecting these dwellings might be taken at £52 per room, and that the Victoria Dwellings'

Association had provided accommodation at £171 per family, the Peabody trustees at £262 to £315 per family, and the Corporation of London at £305 per family. Messrs. Hine and Odgers, however, show very clearly that in Plymouth blocks of dwellings have been, and are being erected, under their direction, in which, under similar conditions, the cost is only £32 per room, including the cost of formation of roads, while accommodation is provided at from 76 to £104 per family. Allowing for the difference between prices in London and Plymouth, they think this shows a more hopeful aspect of the question, more particularly—as they point out—as some of the buildings have already been opened, have been immediately let at about one-third of the London rentals, and pay a clear dividend of 5 per cent.

EXHIBITION AND COMPETITION IN RESPECT TO SCHOOL BUILDINGS.

In order to respond to the desire frequently expressed by the municipal and General Councils in France, and that the Administration of Public Instruction may add to their code of regulations, and be able to communicate when consulted a certain number of typical plans, satisfying the requirements of hygiene; a decree, dated 13th October, has been published, providing for the opening, on the 1st June, 1882, at the Palace of Industry, Paris, of an exhibition of plans for school buildings, lyceums, normal school, primary high schools and professional schools, primary schools of one or more classes, infant schools, and *crèches*. This exhibition will include plans, elevations, and sections of school buildings constructed, in course of construction, or destined to be executed; with indications of the climatical and topographical conditions of the region or country. The hygiene of public schools, which is also at present engaging the attention of the New York State Board of Health, a circular being issued containing sixty-eight questions on the subject of un-lighting, ventilation, heating, water-supply, site, and structure of the school-houses, school-hours and physical health of pupils, the relation of the sexes, and the prevailing complaint and sickness.

'GERMAN' SAUSAGES.

The Poplar District Board of Works, within whose jurisdiction the principal seat of the manufacture of German' sausages is situate, have recently instituted a minute investigation into the circumstances in which the industry is carried on. The Board have just issued a report, in which they state that from the inquiries they have directed to be made in the Metropolitan Meat Market and other places, horse flesh is largely used in the manufacture of German sausages, and there can be no doubt, even if the flesh is sound as far as regards its freshness, that as the horse is commonly slaughtered because of age or disease, it cannot be considered fit for human food. With reference to the future inspection of the sausage manufactories and all other places where food is sold or manufactured for human consumption, the Poplar Board of Works have determined to employ an extra staff of officials for the purpose of suppressing the manufacture of unwholesome compositions, to detect the use of horse-flesh in the making of German sausages, and to bring the offenders to justice. A representation has been made to the Local Government Board to the effect that sausage manufactories should by law be placed under strict supervision, with a view to the examination of all material to be converted into sausages. In connection with this subject, it may be noted that at a recent meeting of the City Commissioners of Sewers, Dr. Sedgwick Saunders, the Medical Officer of Health, reported that during the week for which he reported, 17½ tons of meat had been seized as unfit for human food. That amount brought the aggregate weight of meat seized in the City of London from the 1st of January last to the day noted, up to the enormous figure of 479¼ tons, which represented approximately one-sixth per cent. of the whole quantity received by the toll clerks of the Central Meat Market during the same period. He called their early attention to the significance of the fact, as bearing immediately on the question of the disposal of 'a disease-carrying factor', the amount of which was ever on the increase. The proper treatment of that difficulty involved many considerations seriously affecting the reputation of the Commission as the sanitary authority, and those for their suitable solution required some modification of the present system of selling the condemned material by contract at prices absurdly below its commercial value, and without adequate security respecting its ultimate use.

THE PUBLIC HEALTH

DURING NOVEMBER 1881.

THE mean temperature of the air during November, at the Royal Observatory, Greenwich, was 48°.7, and no less than 6°.4 above the average November temperature in one hundred years. The excess of temperature in November was as remarkable as its deficiency had been in the previous month. Excepting November 1852, when the mean temperature was 48°.9, the nearest approach to the high mean temperature of last month, during the past thirty years, was 45°.9 in 1857. The mean was below the average on the first three days of the month, whereas an excess prevailed on each of the remaining twenty-seven days; on seven of these days the excess of temperature exceeded 10°. Rain was measured at Greenwich on sixteen of the thirty days of the month, to the aggregate amount of 2·3 inches, which corresponded with the average November rainfall in sixty-one years. The rainfall at Greenwich in the first eleven months of this year amounted to 22.7 inches, and was rather more than half-an-inch below the average amount for that period. The sun was above the horizon during 264.4 hours in November, and 55.2 hours of bright sunshine were recorded at Greenwich; this exceeded by 6.5 hours the average amount of bright sunshine in the corresponding months of the four years, 1877-80. Excepting a few days in the early part of the month south-westerly winds prevailed, throughout the month.

In twenty of the largest English towns, dealt with in the Registrar-General's weekly return, 25,895 births and 15,755 deaths were registered during the five weeks ending 3rd inst. The births were equal to an annual rate of 35.5 per 1,000 of the aggregate population of the twenty towns against 35.2 in the corresponding period of last year. The lowest birth-rates in these towns last month were 28.0 and 31.5 in Plymouth and Wolverhampton; while the rates in the other towns ranged upwards to 38.5 and 38.7 in Sheffield and Liverpool. The birth-rate was equal to 35.1 in London, whereas it averaged 35.9 in the nineteen principal towns.

The annual death-rate in the twenty towns during the five weeks of November averaged 21.6 per 1,000, against 24.3, 23.3, and 21.9 in the three corresponding periods of 1878-9-80. The unseasonably mild weather that prevailed during the greater part of November caused the fatality of

diseases of the respiratory organs to fall considerably below the average. The lowest rate of mortality in these twenty towns during last month was 16.1 in Wolverhampton. The rates in the other towns ranged in order from the lowest, were as follow:—Bradford, 18.3; Leicester, 18.6: Plymouth, 19.0; Leeds, 19.2; Portsmouth, 19.2; Bristol, 19.5; Norwich, 19.6; Sheffield, 19.8; Newcastle-upon-Tyne, 20.1; Oldham, 20.5; London, 21.2; Birmingham, 21.2; Sunderland, 21.3; Brighton, 22.4; Nottingham, 22.7; Manchester, 24.1; Salford, 24.7; Liverpool, 27.3; and again the highest rate during the month, 28.6 in Hull. The death-rate last month was equal to 21.2 in London, and averaged 22.0 in the nineteen provincial towns, which have an estimated aggregate population very little less than that of London. The high rates in Liverpool and Hull, were mainly due to excess of zymotic fatality.

The 15,755 deaths from all causes in the twenty towns during the five weeks of November included 747 from scarlet fever, 512 from measles, 409 from whooping-cough, 385 from 'fever' (principally enteric), 184 from diarrhœa, 156 from diphtheria, and 110 from small-pox. Thus 2,503, or nearly 16 per cent. of the deaths from all causes, were referred to the principal zymotic diseases; these were equal to an annual rate of 3.4 per 1000 in the twenty towns, showing a slight further increase upon the rates that prevailed, in the two previous months. Measles and whooping-cough were considerably more fatal during November than they had been in October. The zymotic death-rate last month was equal to 3.3 in London, and averaged 3 6 in the nineteen provincial towns, among which it ranged from 0.6 and 1.5 in Norwich and Wolverhampton, to 5.5 in Nottingham, 5.8 in Liverpool, and 12.4 in Hull. The excess in the zymotic death-rate was due to scarlet fever in Nottingham and Hull, and mainly to measles in Liverpool.

Scarlet fever was again, as it had been in the two preceding months, the most fatal zymotic disease in the twenty towns during November. The annual death-rate from this disease, which had steadily increased from 0.42 to 1.03 per 1000 in the five preceding months, was equal to 1.02 last month; the rate in these towns in November 1880 was 1.07. Scarlet fever fatality was considerably greater during last month in the nineteen provincial towns than in London; the highest annual rates in the nineteen towns were 1.3 in Sunderland, 2.6 in Brighton, 3.6 in Nottingham, and 11.3 in Hull. The fatality of the scarlet fever epidemic in Hull showed a further increase, and the death-rate from this disease, which was equal to 1.0 per 1000 in May, has since steadily increased, month by month, to 11.1 in October and 11.3 in November. The 512 deaths from measles were equal to an annual rate of 0.70, showing a marked increase upon the rates in the two preceding months, which were 0.28 and 0.24; this disease showed the largest proportional fatality in Leeds, Manchester, and Liverpool. The death-rate from whooping-cough, which had not exceeded 0.38 per 1000 in October, increased to 0.56 last month, and was highest in Salford. 'Fever' (principally enteric) caused 385 deaths in the twenty towns, of which no fewer than 230 occurred in London, while 155 were returned in the nineteen provincial towns; the annual death-rate from the diseases under this heading, in the twenty towns, which had steadily increased from 0.20 to 0.54 in the four preceding months, was equal to 0.53 in November. The highest death-rates from 'fever' during last month occurred in Brighton, Bristol, Nottingham, Oldham, and Hull. The fatal cases of diarrhœa in the twenty towns were equal to an annual rate of 0.25 per 1,000, showing a further considerable decline from the rates prevailing in recent months. The 156 deaths referred to diphtheria included 98 in London, and but 58 in the nineteen provincial towns; the average rate in the twenty towns was 0.21, corresponding with the high rate recorded in the preceding month. The epidemic of diphtheria in Portsmouth showed no sign of decline, thirty-one fatal cases being recorded in November; no fewer than 163 deaths from this disease occurred within the borough during the first eleven months of this year. The deaths from small-pox in the twenty towns were 110 during the five weeks of November, and the annual death-rate from this disease, which had steadily declined from 0.61 in May to 0.13 in October, increased last month to 0.15. The 110 fatal cases last month included 100 in London, and but 10 in the nineteen provincial towns; the latter number included 2 in Liverpool, 2 in Newcastle-upon-Tyne, and 1 each in Brighton, Plymouth, Nottingham, and Oldham. Judged by the returns of the metropolitan asylum hospitals, the prevalence of small-pox in London showed a slight increase during November. The number of small-pox patients under treatment in these hospitals, which had steadily declined in the five preceding months from 1552 to 453, were 477 at the end of November; of the latter number, 100 were returned in the Convalescent Hospital at Darenth. The average weekly number of new cases of small-pox admitted into these hospitals, which had declined from 317 in June to 73 in October, rose again to 82 last month. The largest proportional fatality of small-pox in the metropolis during November, was again recorded in the east and south groups of registration districts.

The rate of infant mortality, measured by the proportion of deaths under 1 year of age to births, averaged 144 per 1,000 in the twenty towns last month, against 135 and 136 in September and October; it did not exceed 138 in London, while it averaged 150 in the nineteen provincial towns. This proportion ranged in the various towns from 96 in Portsmouth and 103 both in Brighton and Hull, to 183 in Oldham, and 201 in Salford. The rate of infant mortality in Wolverhampton showed a considerable decline from the high rates prevailing in recent months.

The fatality of diseases of the respiratory organs, judged by the metropolitan returns, showed a further increase during November. The average weekly number of deaths referred to these diseases in London, which had been 138 and 300 in September and October, further rose to 374 in November; this number was 76 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in the metropolis, which had been but 2.2 and 4.1 in September and October, further rose to 5.1 in November. The death-rate from these diseases during last month was equal to 7.1 in Liverpool and 6.5 in Salford.

During the five weeks of November the causes of 310 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner. These uncertified deaths were equal to 2.0 per cent. of the total deaths registered, showing a decline from the proportion in recent months. The percentage of uncertified deaths did not exceed 0.9 in London, whereas it averaged 3.0 in the nineteen provincial towns; the proportions in these nineteen towns ranged from 0.7 in Plymouth, and 0.9 in Portsmouth and Leicester, to 4.2 in Sunderland, 5.0 in Salford and Oldham, and 5.2 in Sheffield. In connection with the excess of uncertified causes of death in Sheffield, it may be noted that the proportion of inquest cases in this borough is considerably below the average proportion in other towns.

Among the population of little less than a million persons living in the outer ring of suburban districts around London, the annual death-rate from all causes in November was equal to 16.7 per 1,000, against 13.[illegible] 14.5 in the two preceding months. The annual death-rate from the principal zymotic diseases, which had been 1.[illegible] and 2.1 in the two previous months, was equal to [illegible] per 1,000 in November. The fatal cases of small-pox in the outer ring, which had been 5 and 8 in September and October, further rose to 11 in November, of which one occurred in West Ham. The deaths referred to scarlet fever in the metropolitan suburbs showed a further increase during November, while those from enteric fever declined.

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap. We can strongly recommend it.' Try also our Superfine Toilet, 2d. tablets.—(Advt.)

THE OPENING OF THE

ɔKE ABATEMENT EXHIBITION

AT SOUTH KENSINGTON.

ernational Exhibition of smoke-preventing ap- instituted by the Smoke-Abatement Committee yrle and National Health Societies, was opened ght Hon. the Lord Mayor, who was accompanied ıeriffs and under Sheriffs, at the Albert Hall on ay the 30th of November. Among the company : present at the opening ceremony were the Mar- orne; H.R.H. the Princess Louise; Sir R. W. Lord Aberdare; the Baroness Burdett Coutts; r-Lefevre, M.P.; Mr. Hinde Palmer, M.P.; Mr. ıe, M.P.; the Right Hon. H. C. Childers, M.P.; lawarr, Harberton, Mount Temple, Arthur Russell; :y Thompson; Dr. Siemens, F.R.S.; Captain Galton; Professors Frankland, Abel, Chandler Norman Lockyer; Miss Octavia Hill, Miss Shaw- Mr. Ernest Hart, and about three thousand others, a great number of persons distinguished in science

ORD MAYOR, in opening the proceedings, said s nothing more injurious to the health of great ın the smoke which was sent forth into the air. d leave it to men of science to explain how it was to prevent this escape of smoke, and how the the atmosphere in our great towns was to be re- He had, however, one practical observation to d that was to tell them that in years gone past prevailed in the marshes of the Thames, but after on of the great factory chimneys the disease had ed people living in that neighbourhood. Whether, it had brought in its train some great defect it ssible for him to say.

RNEST HART read the report of the Committee, l at p. 217.

[ARQUIS OF LORNE moved the adoption of the nd said he might have been excused upon the that for some years past he had been living in a where such a thing as a smoky fog was unknown. glad, however, to hear that Canada was a con- to the Exhibition. He was glad to hear that powers for the suppression of the nuisance were to for from the Legislature. He knew that it had a effect upon plant life, because when he had lived ngton years ago roses were easily cultivated in the rhood, but since the houses had become so dense wth outdoors was no longer possible. With re- the chance of any invention for smoke-abatement r successful he thought it must first be ascertained by its adoption, a saving would be affected in the of coal consumed.

ight Hon. G. J. SHAW-LEFEVRE, M.P., First ioner of Works, in seconding the adoption of the uid that in consequence of the damage, caused ly by London smoke, no less than £2,500 was spent in repairing the exterior of the Houses of nt. Smoke had undoubtedly a very bad effect ınt life in the metropolis, and, although great night be derived from improvement in this direc- he thought we had good reason to be proud of lon parks, which were probably better than any laces in any country. The Government was about nence the construction of another large public the War Department and the Admiralty, and he w-Lefevre) would scan most narrowly the inven- wn in the Exhibition, with the view of using the ıem in the great building.

. THOMPSON, in the course of his remarks, ridi- culed the idea of smoke preventing in any way the spread of ague, and pointed out that the disease had probably decreased in consequence of the drying and ventilation of the ground caused by the erection of large furnaces.

The report was adopted, and the royal and other distinguished visitors present inspected the Exhibition.

Mr. W. R. E. COLES, to whose unwearied exertions, great kindness, tact, and incessant and disinterested work as honorary secretary, the warmest acknowledgments are due, read the report of the Executive Committee, detailing the arrangements and reporting the assistance given by ministers and foreign countries.

We append below descriptions and illustrations of a large number of exhibits which form some of the most interesting features of the Exhibition.

DOMESTIC GRATES, STOVES, AND KITCHEN RANGES.

With a desire to display their exhibits to the best advantage, a few firms have built up erections, showing portions of an apartment, with the grates set as they would appear when in use, and have supplemented them with mantel-pieces, over-mantels, and the entire furniture of the fire-place. This is the case in that of the Coalbrookdale Company, Limited, but here all these accessories are of *cast iron* of their own manufacture, the mantel-pieces being painted in various neutral tints, giving them a very attractive appearance. The exhibits of this Company are of an elegant and unique character, and well worthy of the reputation of this distinguished firm. Ever since the exhibition of 1851, when their beautiful work of art, the Eagle Slayer and Dome, in cast iron, stood in the centre of the great building in Hyde Park, and was so much an object of admiration, and also one of the *chefs-d'œuvre* of the exhibition, they have spared neither trouble nor expense at all International Exhibitions to make their displays worthy of their name and country. The stove and grate department of their business has of late years received much of their attention, and they now stand in this, as well as in other manufactures, in the front rank. At the present Exhibition, beyond the accessories we have mentioned, their exhibit is necessarily confined to fire-grates. Of these there are seven, all, with one exception, having especial claims, either to the economisation of fuel, or the consumption of smoke. The one we take as the exception is, however, of such unique design that we may be pardoned if we describe it in detail. Being the central suite in the group, it will probably attract the eye of the visitor first. A grate of the old pantheon pattern, with Bath bow bars and large hobs, is so set in its recess that one half of it projects beyond the mantel into the apartment. It stands upon ornamental legs, supporting panels of 'Chippendale' design, which are backed by elegant *repoussée* panels in brass. A high backing of fire-clay, of ornamental character, is carried entirely round the back of the grate, and above that are narrow tiles set in herring-bone fashion, completing the back of the fire-place. The mantel, in the 'Adams' style, is coloured in celadon and white, with 'marbled' iron interior slips, the group being completed with an elegant over-mantel, of the same colours, in 'Chippendale' style, having two side cabinets with bevelled plate glass panels, silvered plate glass above, and Venetian-shaped mirror in centre, decorated in a similar manner. At the extreme left of the exhibit is one of their well-known 'Ironbridge' Controlled Combustion Grates, with the new patent 'Kyrle' fire, for burning anthracite coal, which we described at length in the SANITARY RECORD for May. This fire has recently received further improvements, which tend to make the burning of bituminous coal, as well as anthracite, a complete success, to the minimising, if not the entire abolition of smoke. Like its original, it is lined entirely with fire-clay, and, the bottom being solid, the draught is through the front bars by a narrow horizontal opening at the bottom of the fire-brick back, along its entire length, into a back flue. Passing upwards, the external air is drawn in over the top of the fire, through a narrow slit between the back brick and a deflector brick

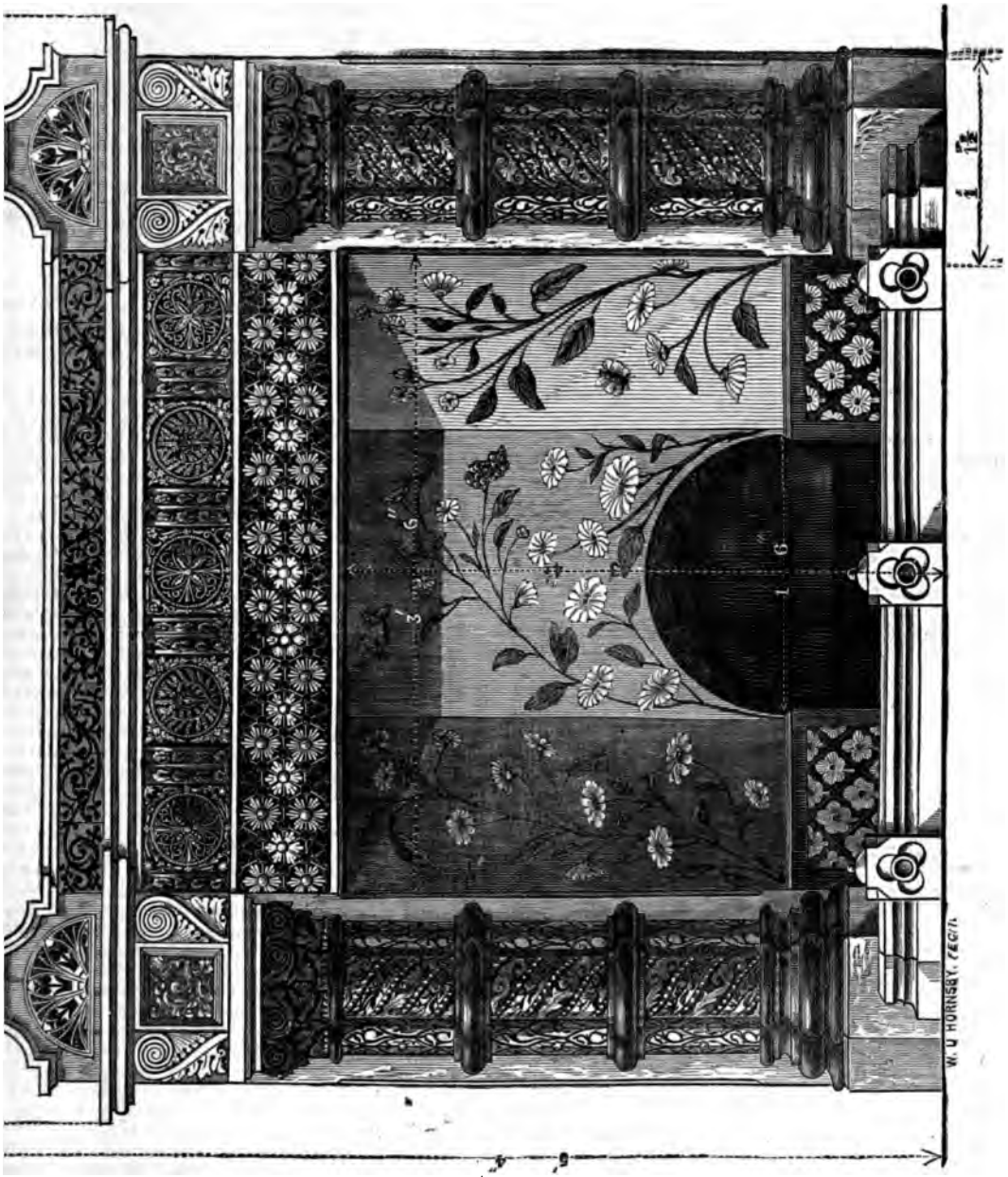
fixed above it at an angle. This external air, mixing with the gases arising in the back flue, assists in their combustion, and in burning the gases we minimise if not altogether destroy the smoke. The heated gases, before they escape into the chimney, have to pass between two fire-bricks, the lower one of which is the deflector brick we have referred to. The space between the two bricks is divided into cells by thin vertical partitions of fire-brick; thus the products of combustion pass into the chimney in an ignited gaseous condition, which is demonstrated in the grate in question by a mica screen fixed in front of the cells, giving the appearance of a double fire. It is claimed that there are no extraordinary flues, no dampers, valves, or loose parts to get out of order. All the bricks are fixed from the front, and can be replaced at any time readily. The whole of the fire-place being of fire-brick, and the flues also, the fire and ignited gases, acting upon the bricks, raise them to a high temperature, and they again react by radiating their heat back upon the fire; and as it burns either the ordinary house coal, anthracite coal, or the now unused gas coke, and since nearly the entire smoke of bituminous coal is consumed—and the thorough radiation of heat, which it effects with any fuel—it necessarily yields a much greater heat value for the fuel consumed than the ordinary grate. The 'Kyrle' principle is adaptable to any of the modern grates at a trifling extra cost. Although it has taken so much space to describe, the principle is very simple, and can be grasped at a glance by anyone of ordinary intelligence, and effects the object in view most satisfactorily. A mantel-piece in the 'Adams' style, and a 'Chippendale' cabinet above, complete this set. Next in order we find another grate of the controlled combustion character, fitted with patent archimedian screw arrangement for lighting the fire at the bottom, which sends the smoke through the fire, effectually burns it, and renders it completely smokeless. That the appearance of the grate may be unobjectionable, the archimedian screw is encased in an ornamental iron box, projecting a little way in the front, and is actuated (to send the fire upwards) by merely inserting a poker in holes at the side, and is very easily accomplished. A handsome mantel-piece, 'Adams' style, and 'Chippendale' over-mantel, with cabinets, are accompaniments to this grate. No. 3 suite is intended for a bed-room, and consists of a more simple mantel-piece, also in the 'Adams' style. Above, is an ebonised mirror and frame, with silvered bevelled-edge plate glass. Here we have what has been named a coal-gas fire, intended to carry out a principle in a domestic grate similar to that now being used extensively in furnaces for manufacturing purposes, viz., to gasify the fuel before utilising the heat. This grate is a self-feeder, holding sufficient for a day's consumption. The fire-basket is rather shallow, and is lit from the extreme bottom through the bars. Above the fire proper is placed a row of vertical thin tapering slabs of fire-brick, open to the back, and fitting against the fuel chamber, forming a number of small chambers; the object of these chambers is that when they become very highly heated, the carbon burned below in the fire becomes converted into carbonic oxide, and this—mixed with the hydrocarbons driven off in the caking of the coal, which is carried out in the fuel-chamber over the fire—is burned in these cells above the fire; the front of them is covered by a mica screen movable; with the aid of this and the blower, a perfectly gaseous fire is displayed, the temperature of which can be regulated to a nicety, and moreover, what is to the point, is really smokeless. The whole products of combustion have, therefore, to pass through these highly heated chambers formed by the fire-brick, which burn all the hydrocarbon, carbonic oxide, etc., and throw off a pure heat, etc., before the residue can escape into the chimney. At the right hand corner is shown a Slow Combustion-Grate, fitted with Welch's patent double flue fire for burning anthracite or ordinary bituminous coal. The arrangement here is simple and automatic, and can scarcely fail to much reduce the smoke. This is encased in another 'Adams' mantel-piece, with a detached over-mantel, or cabinet, all being grained in light oak. No. 2 on the right introduces us to one of Whitwell's Patent 'Save all waste' Grates, which is also a ventilating grate. At the back is a series of oval longitudinal tubes, which communicate with the outer atmosphere that draws the air in, and discharges it into a chamber over the top of the grate in a highly heated state. Here it can be utilised as desired. It may be carried by pipes to warm another room, or can be emitted into the apartment in which the grate is fixed, by means of a ventilator forming a portion of the whole design. Admission to the chimney is by means of a pipe carried through the hot-air chamber, which tends again to intensify the heat, and from the general construction of the grate every particle of fuel is burnt with the smallest modicum of residuum. The mantel piece encasing the Whitwell grate is of classic design, modelled by the late Alfred Stevens, the figures standing out in high relief, and is coloured in two shades of terra-cotta. A charming over-mantel, with bow cabinets coloured *en suite*, complete the Whitwell set. The other on the right is another bed-room suite of a similar character to the one previously described, with one of the controlled Ironbridge slow-combustion grates. The only other article exhibited by the Coalbrookdale Company is a model of 'Gudgeon's' Patent Sliding Mantel-Piece, which is a novel idea, and intended to aid those, who, living in houses not their own, are desirous to improve objectionable mantle-pieces at moderate expense, and to enable the substitutes to be removed when they leave without disturbing the original fittings. This mantel-piece is intended to be made in cast-iron, and in such a manner that it will fit upon and entirely cover any old ones that the tenant may desire to screen from observation, and can be taken away when a change of residence occurs, leaving the old one as it was. They are made to slide on panels, so that one mantel-piece may be utilised for any sized opening. The invention is capable of a variety of modifications, and from the point of view of the patentee will probably find many adherents. We may add, that all the suites of the Coalbrookdale Company are supplemented with fenders, tile-hearths, etc. By the initiative step they have taken in the introduction of the articles we have described in cast-iron, they have indisputably shown that really good designs can be produced at a cost that will compare most favourably with wood or any other material now employed, and with several advantages in their favour.

The principle adopted by Messrs. Boyd and Sons, of New Bond Street, in their Warm Air Grate is very simple, though so effective that without any mechanism whatever the amount of heated air circulated is nearly double that of most warm air grates. This is brought about by the back and sides being cast in a zig-zag form instead of flat, and consequently the air, in passing through the chamber constructed in the stove, has presented to it a very considerable heated surface over which it has to travel. A further point in its favour is, that being complete in itself, it can be fixed by a labourer in the place of any existing register grate.

Mr. James Smith, Vine Street, Liverpool, exhibits an open fire-grate of rather peculiar construction, burning a combination of bituminous and anthracite coal, placed in separate bodies, which are consumed in conjunction. The one shown is of a large size, holding about 40 lbs. of fuel, but it can be made in various sizes, and the inventor lays great stress on the assumption that any existing grate may be altered to his principle at but little expense, which produces a smokeless fire at an economical price. If the reader will imagine the back part of the fire-basket of his register grate taken away, and an iron plate fixed from the back to a point about in a line with the back of the fire-basket before it was removed, and well above the fire line, with the front from the hearth to the bottom bar closed with a movable wrought-iron plate, he will gain a fair idea of its appearance. Into the back chamber bituminous coal is placed, the front being filled with anthracite, in the proportion of nearly two parts of the latter to one of the former. The fire having been lit at the front, in time reaches the bituminous coal at the back, and this chamber becoming highly heated assumes somewhat the functions of a retort, and as the gases from the bituminous coal are separated, they are burned, and the products have

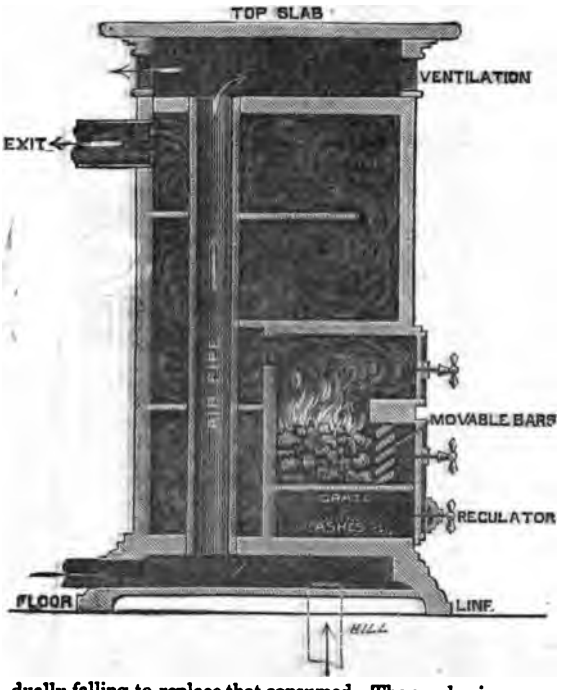
ass over the iron plate before mentioned ere they can h the flue, and are in consequence rendered harmless. main draught is obtained by bringing in the external o the closed ashpit under the bars of the grate, which rs the fire through the bottom grating, and so provides cient in the first place to light the anthracite, and this be afterwards regulated as required. This grate burns ry long time without attention, and the inventor claims he has produced an arrangement combining the advan- s of the American closed stove, with the appearance of English open grate.

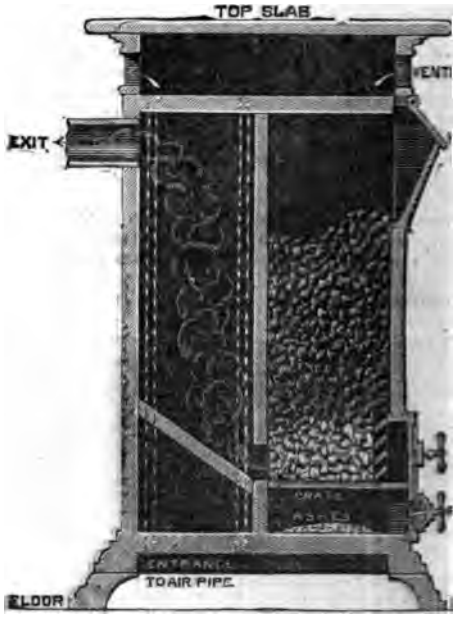
he attention of Messrs. Doulton and Co. is now being nsively directed to the manufacture of radiating tile es, and complete fire-places of terra-cotta glazed, and



ed in their best manner. Occupying an extensive in the eastern quadrant, they have erected some com- suites of *garnitures de cheminée*, the centre group being composed of a large, but plain brown oak mantel and over-mantel. The mantel has probably been made plain to enable the firm to show to better advantage the Lambeth *faïence* tiles. Seven subjects from the *Midsummer Night's Dream* in oblong *plaques* have been selected as the principal embellishment here, though there are several others of different shapes and patterns inserted at other points; and the pilasters of the mantelpiece contain two full length figures—male and female—in early English costume. But it is the fireplace in which our interest is more particularly centred. This is composed entirely of fire-clay, the angled sides and back being beautifully painted, and leaving only a small arched opening to communicate with the chimney, the fire of coke or coal, burning on the hearth, raised only the thickness of one fire-brick from the ground, and having a single iron bar supported on legs, a few inches deep, which is placed in front of it to keep it in its position. We subjoin an engraving

of a fireplace of this class. Owing to the great mass of fire-clay, the fire burns admirably, and with little smoke. Another system of fireplace, adopted by Messrs. Doulton, is composed of an open framework of iron, with an arched ventilator at the top and interstices at the sides for tiles. The interior, or grate proper, is entirely of fire-clay. It is finished with a flat top, the opening to the chimney being a narrow slit at the back. A valve worked from the front opens or closes the direct communication with the chimney, and, when closed, the products pass down side flues and partly through the fire ere they escape to the chimney. The mantelpiece enclosing this grate is supported by elegant columns of the celebrated Doulton ware. A massive German stove, about 10 feet high, forms a prominent feature in the exhibit. This is made with an open fireplace in the lower part of the front, as well as the close stove at the side, either of which can be used separately or together, and is a smoke-consumer. Numerous independent stoves of various sizes, colours, and designs are also exhibited, from the most simple and inexpensive to others of the most elaborate pattern, and suitable for large public buildings, mansions, etc. Messrs. Doulton adopt two systems in the interior construction of these stoves, which we illustrate by sectional blocks. This first represents the class fed at the bottom, and shows the air-pipes passing through cross flues, and also the entrance for fresh air through the floor from the outside. The cross flues cause the circulation of the heated gas from the fire to pass over every part of the inner surface of the stove, and to be practically smokeless. The other represents those fed from the top, the fuel being inserted through the hopper door, and gradually falling to replace that consumed. The smoke is consumed by passing through the incandescent mass of fuel before reaching the exit to the flue which is immediately behind the grate. On each side of the back flue is an air-pipe conveying heated air to the room. In this stove there are no cross flues. It is almost unnecessary for us to dilate upon the appearance of these stoves, or the applicability of fire-clay as a heating medium. Its power of absorbing heat and giving it off slowly is now generally known, and it is a fact that stoves made of this material will warm a room for several hours after the fire has been allowed to go out. They compete very favourably in price with iron stoves, do not burn the air as metallic substances often do, maintain an equable temperature for a great length of time, are very economical in use, and require no beyond dusting or washing. To embellish the

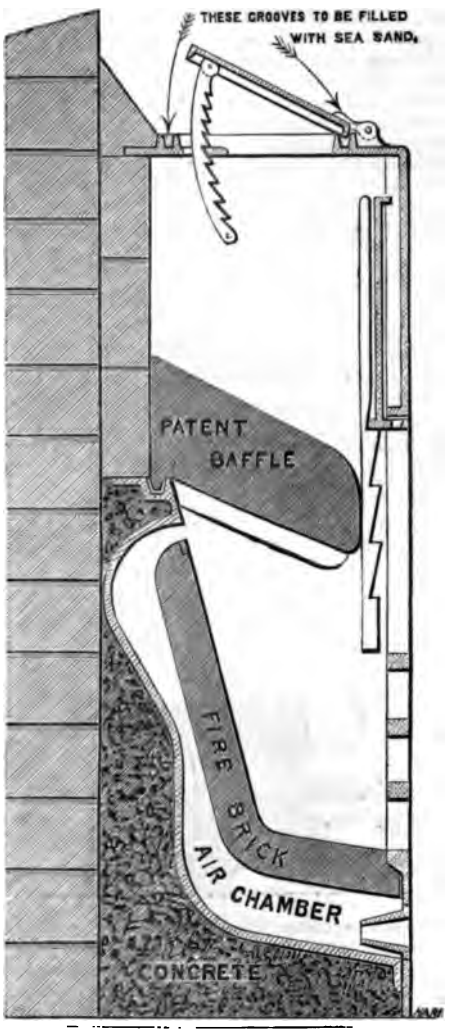




of their exhibits Messrs. Doulton have brought some of the choicest hand-painted *plaques* and orna their manufacture.

At Messrs. Barnard, Bishop and Barnard's stand found more than one exhibit of high scientific in economic as well as artistic value, in the shape of Slo bustion Stoves, the principal features of which are—fi the fire itself is placed nearer to the ground, and h heat is distributed over the lower strata of air instead given off into the middle strata; and secondly, that th no fire bars or other openings beneath the fire, by w ordinary grates currents of cold air are made to pass t the fire, causing rapid combustion and carrying h unconsumed carbon up the chimney. A further devel of this improvement has been made by the joint la Messrs. Everitt and Barnard, to which they hav the name of "The Glow" Stove. This is an ope combustion stove, the bottom of which, as in all slo bustion stoves, is closed in. Below this, in front number of holes beneath, and parallel with the surfa which the fuel rests. These openings are connecte an air chamber at the back of the grate, which c has an outlet immediately over the fuel. A "Ba fire-brick, reaching the front, and about an inch ab openings from the air chamber, extends the full w the stove, springing from the back at an angle of abo The objects of this "Baffle", which becomes red-h to form a combustion chamber in which the smoke sumed, and accumulate heat, which would otherwise up the chimney, and to throw the accumulated h the room. Of course, nothing but practical experie determine how far Messrs. Everitt and Barnard ha ceeded in solving the problem of "perfect combu but the success which has attended the inventions of Barnard, Bishop and Barnards, of which firm Mr. Barnard is a member, entitles us to assume that the stove will emerge successfully from scientific tests. hardly be said that Messrs. Barnard, Bishop and Ba with their usual good taste in the manufacture of mantel-pieces, and surrounding decorations, have play that must elicit the admiration of all who are ested in the application of art decorations to our rapidly improving system of stoves. The new grate to above is, like the others made by the firm, sim construction, automatic in action, and almost impos put out of order. This is a most important feature

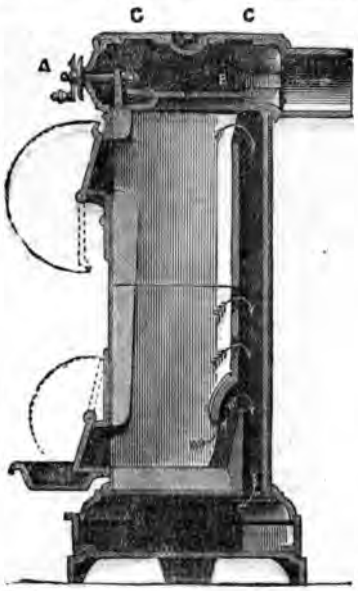
grate professing to be a smoke-consuming one. That its principle may be clearly understood, we subjoin a sectional engraving of it, and a front elevation. In the latter, it



will be observed there are a series of holes along the front below the fire-bars. These holes communicate with the air chamber shown in the sectional drawing as running up behind the back of the fire. Through the holes a continuous stream of air enters, which becoming heated in the chamber is discharged over the top into what is termed the combustion chamber, just under the patent 'Baffle', which is a thick block of fire-clay. The products of combustion having reached that point are, for the moment, arrested in their progress, and the heated air from the chamber mixes with them and turns them into a gaseous flame, from which position they pass up in front of the baffle, and behind the ornamental front of the grate into the chimney. By this arrangement a large part of the heat which, under ordinary circumstances, would pass direct into the chimney in the form of thick smoke, is here burnt and exchanged into heat, which is given off into the room. The fire-brick baffle is movable, and can consequently be replaced at any time, or removed for sweeping the chimney, which, however, rarely requires to be done, as so little smoke enters it. As a cheap and effective smoke-consuming grate, the 'The Glow' is one of the distinctive features of the Exhibition. Apart from the very choice collection of artistic slow-combustion grates shown by Messrs. Barnard, Bishop and Barnard, their collection of kitchen ranges is well worth the attention of the public.

Messrs. Yates, Haywood, and Co., Upper Thames Street, exhibit a novelty in a grate claimed to be a perfect smoke curer. It is of the ordinary register type in its general contour, and under ordinary circumstances it appears as such, but should a down draught occur in the chimney, and smoke be emitted into the apartment, an ornamental lid of iron is drawn forward by means of the poker, and completely covers the top of the fire. This action also brings a door or 'register' with it, and closes the direct way to the chimney, the smoke passing through a narrow horizontal aperture at the back of the grate. At the same time the front bars, which are made of flat iron, are tapped with the poker, and being pivoted, overlap each other, like the louvres of a venetian blind, and close the front of the fire also, making it a complete furnace. The draught that now enters through the bottom completely overcomes the most obstinate down draught, and causes the fire to roar, and in a few minutes a bright fire is obtained, the bars are put back to their normal position, the lid is lifted up, taking the 'register' back with it, and the grate is again an open register. The opening or closing the grate is the work of not more than a minute, and, judging from the effect produced on the fire at the Exhibition, where it is certainly shown under adverse circumstances, though perhaps the best for testing its capabilities, it can scarcely fail to be effective. A Siemens' fire of gas and coke, which is now so well known as to render a detailed description superfluous, is shown in a handsome dining-room grate, with artistic tile cheeks, and is encased in a magnificent 'Waulsort' of brown brocatelle and a black marble mantelpiece, carved in dead relief. This mantelpiece secures an amount of interest from the fact that it has been modelled from a prize drawing executed by one of the students at the South Kensington School

of Art. Mr. Haywood, one of the partners in the firm, offered a prize of ten guineas for the best design for a dining-room mantelpiece, and the one in question is the result of the competition. A slow-combustion Hall stove, panelled with tiles all round, and entirely lined with thick fire-brick, burning thirty-six hours without attention, under perfect control, and costing about threepence for that period of time, is a conspicuous feature in the exhibit, and a slow-combustion blower grate is noticeable for its good design. The remaining feature in Messrs. Yates, Haywood, and Co.'s exhibit, which appeals to all economists, is the 'Miser' stove, consisting of three cylindrical pillars, so named on account of the remarkably small cost at which it is worked. We append a drawing of it in section, by which it will be seen



that the heating surface extends over a large area. It not only burns anthracite or bituminous coal with equally satisfactory results, but any refuse, such as the residuum from household grates, etc., appears capable of giving off a good heat when relegated to the 'Miser', and we are assured that careful tests have proved that it does not cost more than a halfpenny for twelve hours. The sectional block shows the centre portion of the stove, the curved arrows pointing the direction the hot gases take from the body to the back chamber, which becomes highly heated. After passing downwards through the fire, and circulating in the hollow base, they ascend the side pillars into the top, and going round a portion of it pass through the outlet into the chimney. All the surface of the stove is thus used for radiation and diffusion, and the air is kept at an agreeable temperature, and not burnt or vitiated as in many stoves; the gases are burnt or destroyed during their progress, and smoke accordingly reduced to a minimum.

At the farther end of the Western Quadrant is the exhibit of Messrs. Steel and Garland, of the Holborn Viaduct and Sheffield, containing some of the most handsome grates in the building. In connection with smoke consuming grates, the name of this firm has become identified with the 'Wharncliffe', of which we have had occasion to speak on previous occasions, and which has so far proved one of the most successful introduced, both as an economiser of fuel and smoke consumer. The firm now exhibit a new grate, named the 'Kensington', here illustrated, of which one or two very elegantly finished specimens are shown, and they claim that it is one of the most perfect smoke consumers yet introduced. The back is formed of fire-clay perforated with several holes, and behind this is a chamber or smoke flue extending its entire length from the base of the chimney; and again at the back of this is a warm air chamber, communicating with the outer atmosphe emits its heated air into the apartment through v shown in the front of the grate at the top. At first a direct communication with the chimney is obt opening a valve, but after the fire is well alig closed. The draught is then through the fire,

admitted through the perforated grating in front t fire box. The products from the fire pass over t and down a narrow flue, where it is met by and i ated with the air from the front, which provides

amount of oxygen, mixes with the hydrocarbons, combustion, and passes up the flue before-named. combustion more complete, the heat from the fir upwards attacks the products passing up the flue of the holes in the fire-brick back, and converts flame, thus destroying all semblance of smoke. T will burn any kind of coal, and it is calculated means of the chamber before-mentioned the heatin is greatly enhanced, and that about 50 per cent. be obtained with the same quantity and quality of this grate stands the testing of the experts, to w firm are anxious to subject, it is likely to prov the most difficult to surpass in the points clai it, in the exhibition. A new pillar stove of i construction is, in addition, exhibited by the fi for the first time. This is also worked out smokeless principle, and appears to answer pose admirably. It will be observed by the accom

illustration, that it consists of three pillars, the centre one being the largest. It will burn any kind of coal with equal facility, and coke or cinders is as readily dealt with by it. It is much smaller in size than many stoves of its class, yet the heating surface is so large, that it will radiate greater heat than many of more extensive proportions. The combustion is slow and complete, as the hot gases have to pass downwards through the fire, then circulate in the hollow base, ascend each side pillar, and after passing round a portion of the top, escape into the chimney. It will be readily conceived that with such an extended area of heating surface to pass over, the gases from the fuel are readily burnt before

reaching the outlet; and the heat is rendered the greater by its being lined with fireclay. It is calculated to burn as long as twelve hours at the cost of one penny.

The Derwent Iron Foundry, the name of which has become so associated with the Abbotsford Register, of which they were the inventors, the first of the modern grates framed upon the principle of slow combustion, exhibits three suites of fire-place appendages in a more or less modified form. If the collection is not large, it is of high artistic merit, and one grate and its appendages is, probably (viewed as a work of art) the finest piece of iron-work in the exhibition. As bearing directly, however, on the main question, they show a new smoke-consuming register to burn ordinary coal, which, so far as we can at present judge, answers its purpose admirably in each of the points sought to be attained. The bottom bars of this grate are tubes open at front and back, and there are two entrances to the chimney. At first lighting the direct way over the fire is opened, and the products ascend in the usual way. This is, however, only allowed for a very short time, when it is closed, and they pass into a chamber or pocket flue at back, and descend to a level of about the open end of the fire-bars before mentioned. Here they are met by the air that has been admitted through the bars, the oxygen of which mingles with them, and a further supply of hot heated air and flame drawn through the lower part of the fire from the front. The three consequently meet, and the draught created by the two last named draws the products up a second chamber communicating with the chimney. It is almost unnecessary to say that before they reach it, all smoke has disappeared; but it may be supposed that a large amount of heat is lost up the chimney, the combustion of the smoke taking place at the bottom, and it would be so, but for an arrangement to arrest and utilise the heat. This is provided by another chamber at the back, the air in which becomes heated from its contact with the outside of the second chamber and is then admitted into the room through an ornamental ventilator in the front, the air from which may be drawn from the outside or any pure source.

As a means of preventing smoke in all descriptions of furnaces for manufacturing purposes, and also for land and marine boilers, the Wilson Patent Gas Producer is exhibited by Mr. Bernard Dawson, Malvern Link. Firing by gas has for some time been acknowledged as possessing important advantages over solid fuels; economy, absence of smoke, and a minimum of attention being the principal points gained. The Wilson Producer comes to us with good credentials, having been used by some of the largest firms in the kingdom with success, and for various purposes. Thus we find it in operation for refining iron, for puddling, for steel melting, for annealing wire, for glazing art pottery, and numerous other industrial pursuits. It will transform every portion of coal, except the ash, into combustible gas, and leave no coke residue. It will burn fine slack coal, and utilise the same in the production of the most intense heat with perfect facility. It will also consume cinders, coke, sawdust, breeze, or any combustible matter containing up to 50 per cent of ash. It may be placed close to, or at any distance from, the point at which the heat is required; in the latter case, the gas being conveyed to the required spot by a pipe. It is in its outward appearance, a simple cylindrical apparatus, but, for certain reasons, we refrain from giving particulars of its interior construction. It occupies a ground space of only 9 feet by 14 feet, and this size will gasify 4 cwt. of coal per hour, while by the old system, for effecting the same work, an apparatus 19 feet square would be required, and it is claimed that the first cost to accomplish the same amount of work, in a given time, would, in the Wilson producer, be only about one-third. The operator has perfect control over the machine, and can arrange the temperature so as to obtain either an intense local temperature or a moderated heat, uniform over a large area. The entrance of air can be arrested at any moment, so as to suspend combustion entirely, and it can be put in full working order in a very short time.

Ireland is represented at this Exhibition by the noted firm of Musgrave and Co., Limited, of Belfast and New Bond Street. For the particular class of close stove, of which Messrs. Musgrave and Co. make a speciality, there is nothing in the Exhibition to surpass them in appearance, and very few that approach them; indeed, in principle of construction, and the other qualities that help to make up a good and reliable stove, they are hard to excel. At most International Exhibitions, and many others, since 1862, the firm have been represented; and at the Paris Exposition of 1867, after a lengthened trial in the testing-house, two prize medals were awarded them, and they have generally been victorious wherever they have exhibited. Speaking of them at the present time, when so many others of similar principle are made, we can truly say they are among the best of the best, and have been improved from time to time under five different patents. They are manufactured on the most approved sanitary basis. They draw in a large amount of fresh air from external sources, which travels over a wide area and all around the bottom before it is emitted into the building, and the products and heat from the fire have to pass through an extended flue in the stove before they reach the chimney, utilising the bulk of the caloric and robbing the products of most of the gases evolved, so as to render them almost smokeless. They are lined with fireclay, and hold sufficient fuel to last from eight to twenty-four hours, and may be kept in the whole winter with perfect safety, and but little trouble. They are mainly on the slow-combustion principle, burn common or anthracite coal, cinders, etc., and are consequently very economical. In price and design they vary considerably, being made at

very low price in iron, and also entirely of tiles, except me framework, which, in numerous instances, as here etown, is nickel plated, and suitable for the most costly vansions or public buildings; in fact they are made for ery purpose where heating apparatus are required, and h e makers now claim that they are the most perfect and economical air-warmers that are made. They have recently turned their attention to open fire-grates, and the result is a new smokeless one called the 'Ulster', which we illustrate. In appearance it is similar to an ordinary register, and is a self-feeder, holding sufficient for a day's consumption, the fuel being put in through the door, shown at the back of the grate is fitted with a back pierced with longitudinal openings communicating with a chamber opening directly into the chimney, and it is supplied with two valves, worked by knobs in the upper part of the front. One of these acts upon the direct upway to the chimney from the fire-basket, the other from the back chamber to the chimney. On lighting the fire, the direct access to the chimney is closed, and the draught is sent through the open back into the chamber behind, the valve in connection with this being open. A great draught is here obtained, which may be observed by the roaring of the fire, and excellent combustion is the result, materially reducing smoke. When the

back. It projects well into the room, tending to warm the apartment thoroughly, and is made on the slow-combustion principle, the bottom, back, and sides being of fire-clay; but a bright fire is maintained by the admission and distribution of heated air amongst the gases of the fuel. The air is admitted at the sides, and passing to the back is discharged through holes in an oblique canopy over the back into the products, which it converts into flame, and renders it practically smokeless. This is the case with bituminous coal; but with anthracite, which it burns equally well, the absence of smoke is still more apparent. Another feature in the 'Ulster', tending to make the combustion more perfect, is a perforated folding curtain, made to slide up and down, in front of the fire, but allowing it to be seen through ornamental perforations, which can be made to any design. Some of these grates are fitted with a simple arrangement in front for stirring the fire without the aid of a poker, set in motion by a lever at the side, which effects the object better, and without creating so much dust as the ordinary poker. Altogether the 'Ulster' is simple, effective, and economical, and should rank amongst the best of the modern grates made on smoke-consuming principles.

The Sunderland Open Fire-grate, similar in appearance to an ordinary arched-front register, is exhibited by Mr. Herbert Lea, of 4, Warwick Street, Regent Street, W., the agent for the patentee. This grate, the invention of a gentleman in Sunderland, has been introduced to burn South Hetton coal, though we see no reason why any kind of bituminous fuel, or probably anthracite, will not succeed as well in it, as the draught appears to be all that can be desired. The fire is burnt up, the back valve is closed and the front one opened, the products then ascending in the ordinary way. On adding fresh coal the action is reversed for the purpose of promoting proper combustion.

The exhibit of Feetham and Co., Clifford Street, Bond Street, proves that they are fully alive to the requirements of the present movement, and one or two of the articles on view contain points of originality of which there are no other exponents in the buildings. For instance, a Dog Grate is exhibited, which is a smoke consumer; a desideratum that will be appreciated by those who prefer this class of stove. This is effected by having a small opening to the chimney from the back of the grate, instead of the over-head one, and by admitting air through side chambers that are gilled to arrest its progress, and consequently to heat it to a higher temperature up the back, and so on to the fire, where the unburnt products are consumed before they can escape to the chimney. The W. F. S. Kitchener is a most complete cooking apparatus, and may be made at a moderate cost to suit the requirements of a small family, as well as for large establishments. Although in every respect a 'close' range, it has the advantage of being able to present a large open fire sufficient for roasting a large joint when required, by merely opening two doors in front of the fire-box. Apart from the ordinary baking oven on the one side, it has, what, (although an oven in appearance) may be termed a 'perfect' roaster. This is large enough to hang a good-sized joint, by means of a bottle-jack suspended outside, the chain from which is passed through the hot

To secure a constant stream of air to ventilate it, it is provided at the side, through which it enters the er and passes out at the back. Not to lose sight of omy in fuel, this range is so constructed that if only a fire is required, instead of being at the bottom of the ox, and so away from the hot plate, the entire bottom e raised by means of a lever, and so bring the fire ly to the hot-plate, and the boiler, by being surrounded ieries of gills, is enabled to be kept at proper tempera- even with a very small fire. But the most important e of this range is its smoke-consuming properties. good-sized pipes at either side of the fire towards the idmit a constant stream of air, pass it along the top, it down at back, and bring it up at the sides, where ischarged into the fire with the usual results. There is exhibited the Sayer's Range, complete in itself, ing no brick-setting, and modelled in a very similar er to some of the German ranges. It burns but a mall quantity of fuel, and that absolutely to dust.

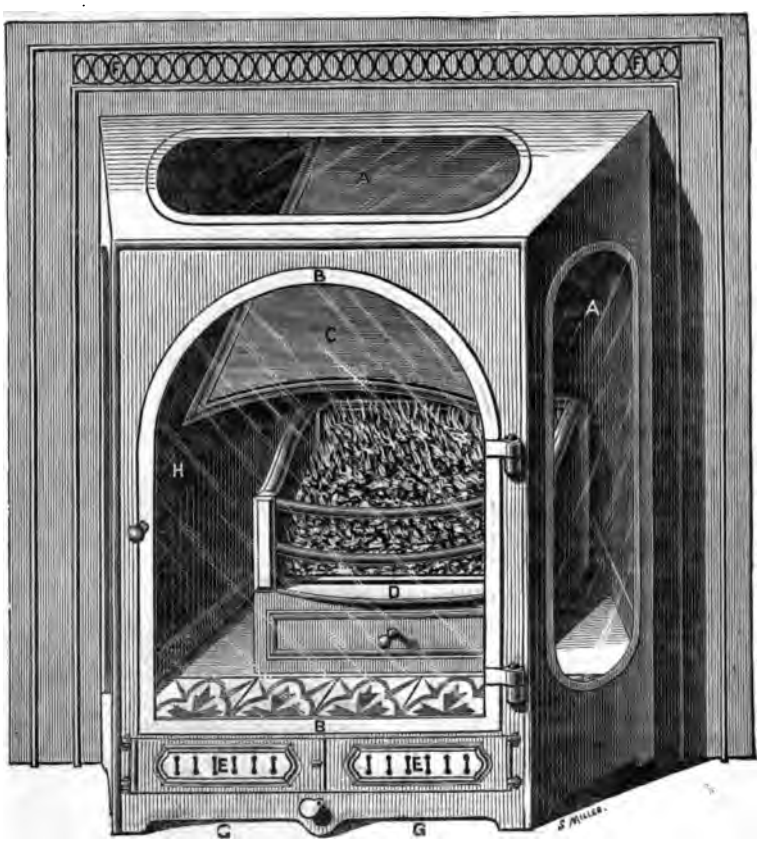
is a very compact Warm-Air stove to burn Anthra- oal, and a Slow Combustion Hot-Air Stove with a ble blower that can be used to cover the front of the fire, or to close the ash-pit underneath. But to many, the 'Rumford Calorifer' that towers high above all the other exhibits of the firm, will prove the most interesting, as presenting a kind of historical link in the stove trade, while to others it will conjure up reminiscences of scenes long past, in which, probably, they in their earlier days took part. The 'Rumford Calorifers' were the stoves by which the old Houses of Parliament were heated, having been erected in the Royal Institution, and it was the original founder of the firm of Feetham and Co., that, under the directions of the late Count Rumford, made the original patterns, and built up this heating apparatus in the rooms above named. Count Rumford, as many of our readers are no doubt aware, was a great authority on the subject of grates and heating apparatus, and the Rumford stove, another to which his name still clings, is occasionally to be seen now. We have thought it would be interesting to introduce an engraving of this appliance, which has been modernised in its interior arrangements, in order to meet the requirements of the present day. It will burn anthracite, and is consequently smokeless, and holds sufficient fuel to last for five days and nights. The accompanying

illustration shows the exhibits of the firm at the 1862 Exhibition. The Rumford Calorifer, a high pillar stove with vase and eagle, being seen towards the left hand side. It can be regulated as regards its heat-giving powers to the greatest exactitude, and viewed as an example of a heating appliance of a by-gone age, its model may well be studied to advantage by manufacturers of the present day.

Carrick's Patent Ventilating Stove-grate, exhibited by the Northern Foundry Co., 46, Upper Thames Street, E.C., is an entirely new departure in domestic fire-places, having some very important features, and justly claims the attention both of economists and sanitarians. It may best be compared to a dog-stove, as the fire burns in a portable grate, standing under a canopy which receives the smoke, etc.; but instead of the walls being built of brick or tiles, they are made of sheet iron, and it stands upon a floor of the same material, raised about two inches above the level of the room, which allows the air to pass under it to a chamber behind the sheet iron walls, where it becomes thoroughly warmed, but not burned, and passes into the

the ceiling to within twelve or eighteen inche gaselier, and sufficiently wide to ensure that the pr combustion shall pass within its containing lines, v conducted by means of a shaft, nine inches by tw to an opening at top of enclosed chamber of sto establishes a powerful down-draught which imp finds its way under the canopy and up the chim what smoke there may be arising from the fir arrangement, combined with the other properties stove will, it is said, resist the fiercest blow-do any chimney.

The names of Messrs. Henry E. Hoole and Co., Lane Works, Sheffield, are recognised as being th makers of art work in this industry in the district. They send to this Exhibition three ne signed grates, finished in the best style of Sheffiel manship, and offering features of a decidedly character. Had these grates been in action they have attracted a much greater amount of attentio illustrate one of three, named the 'Interchangeab



apartment through perforations in the ordinary way. This of itself is an advantage over many patent stoves, where the air is often liable to be superheated, and so rendered unfit for respiration. But the peculiarity of this invention remains to be explained. It consists of an iron structure projecting some seven inches into the room (somewhat resembling an ordinary register placed back outwards), in the sides and top of which are fitted leaded panels of either clear or tinted glass, while a door in front similarly glazed completes the arrangement. Thus the cheerful appearance of the well-known fire-place is retained without its drawbacks of draughts, dust, and waste, and, whether the stove is open or enclosed by the glass-door, the combustion is slow, and undoubtedly the full amount of heat obtainable from the fuel is circulated. Shown in connection with this stove is a Gaselier Canopy, formed to reach from

made to burn either anthracite or bituminous coal. of the grates is designed upon the same lines, vi of a complete independent heater, to stand in the c recess, and to communicate with the chimney by leading from it. The recess to receive these g formed after the style of those for dog grates, and with tiles or metal surfaces at pleasure, into wh placed, requiring no setting whatever, the onl necessary to be done is the closing of the chimney c except where the pipe passes into it. The 'Inter able' is a highly finished grate, being nickel-plat the whole of its bright surface to prevent rust, a ning upon rollers, it can be easily withdrawn at a should necessity arise. The fire basket is of fir perforated with numerous openings for the admi air, which can be freely supplied to it, from its

thus assisting the process of combustion, and ıe hydro-carbons evolved from the fuel in the . It will be gathered from these remarks that rs all the advantages supposed to accrue from viz., the means of throwing off and radiating ıt of warm air, with the ordinary bright and

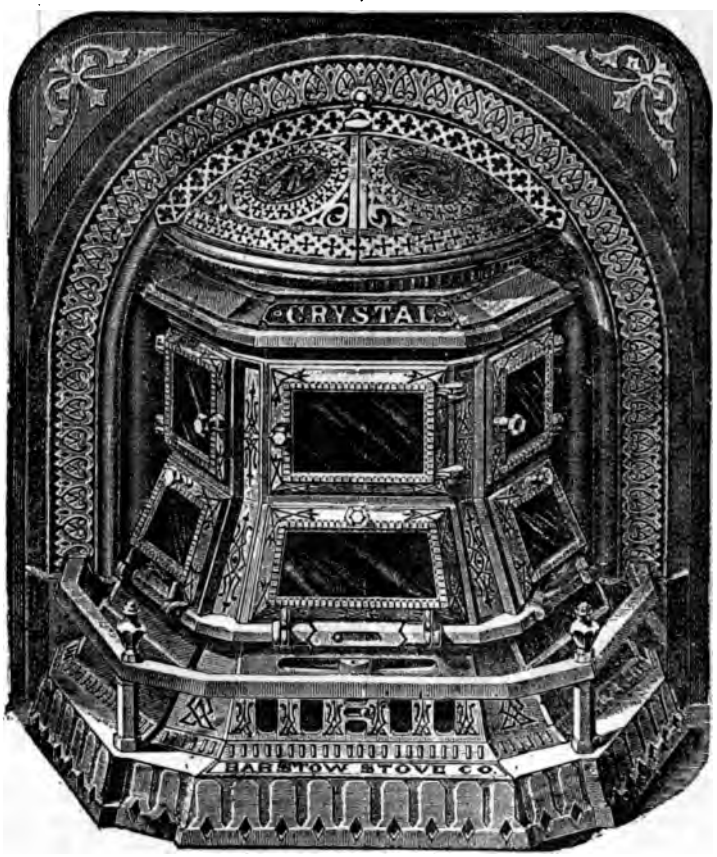
Mr. Wm. Stobbs, the Secretary of the Anthracite Coal Company, Victoria Buildings, Victoria Station, S.W., has recently introduced a new American range, the 'Beebe', and a sitting-room stove, the 'Crystal', into London, both of which are illustrated below. The 'Beebe' range is more after the style of an English one than anything we have seen coming from America, and burns anthracite coal most effectively. The ovens are made with fall-down doors, that rest at right angles to the front, to enable the contents to be drawn out for examination when required. Their interior is formed in an oblique manner, towards the back of the fire, giving a similar angle to the air chamber at the sides, and valves regulate the supply as found

ı fire. To burn anthracite coal, the small ı in the front is taken off, and a larger one, or d into its place, and the increased draught ient to burn the non-bituminous fuel effec- her of the grates exhibited is a radiating and for burning bituminous coal without smoke, iple of side feeding is adopted, but is so ar- ıe apertures for receiving the fuel form a part, of the design of the grate, and there is no otion employed, neither is there anything to in the arrangement or to destroy the artistic general design. The front is in the form of erted shell, the whole of which is utilised for . The design of the fire basket is such that ther end finish in connection with a kind of very much like an ornamental cheek. These at the bottom, the lower part of the side re, and the solid portion of the sides are per- small holes. A hinged lid, forming part of lifted up when fresh coal is required, and the ıly requires to be small, and may, in conse- a cheap kind, is put in with an ordinary hand coal, coming in contact with a portion of the es, becomes coked, and the gases generated o the fire through the openings before men- ın the coked fuel is required for the fire, a ted in a hole in the box made for that pur- a lateral motion of this, the fuel is pushed he centre of the fire. It will be understood ıription how simple the arrangement is, and spects, those that we have referred to in con- he 'Interchangeable' grate apply. The third dification of the previous one. This is with- ıg boxes at side, which are here represented

Air is admitted through openings in front conducted round, and discharged into the forations in the back, which combine with the ses of the coal, with the usual results. At grates have not been put in action, but, should lescribed carry out our expectations, they will ns to the number of smoke-abating appliances, , of no mean pretensions.

necessary. A good supply of air is introduced to mix with the gases from the fire, all of which, after passing round the ovens, have also to pass through the fire before entering the chimney. Like all American ranges, the fire-box is small, and consequently burns but little fuel, and the bars

are vertical, and are curved at their lower ends, and carried underneath, making front and bottom in one. By removing a covering from the front of the bars, grilling can be carried on under the bottom of the grate; and for emptying the contents of the fire-box, the bars are dropped forward from the front. All the parts of this range are interchangeable, a most commendable system, which is generally carried out in American stoves, and the other arrangements are all that can be desired. The 'Crystal' stove is similar in shape and character to that we have alluded to in Mr. Harry Hunt's exhibit. It burns anthracite, and with little expenditure of coal; it draws the air from



the outside, passes it well round the bottom of the stove, warming the lower stratum of air in the apartment thoroughly, and emits a constant current into the room from the sides, and from a large chamber at the back, where it can be stored and highly heated, if required, before use; or by opening a valve over the top of stove at the back, by means of a knob in front, this heated air can be sent to the upper floors by means of a pipe connected with the stove, and be utilised for warming a bedroom, should a fire not be deemed necessary.

Mr. Harry Hunt, Newington Green Road, London, N., whose Crown Jewel American Stove we have fully described on previous occasions, is present with this anthracite coal stove in a more ornamental form, with embellishments of nickel plate. Mr. Hunt also exhibits a cheap circular heating stove based somewhat on the principle of the Crown Jewel, which he has named the 'Economy'. It is lined with fluted fire-clay, and has a talc covered door through which the fire can be seen. It is fed from the top, and the arrangements for clearing out the fire-pot are simple and effective. Instead of the ordinary raker, the use of which almost necessitates the person using it going on their knees and opening a door in front, a knob or handle at the side is

provided, which being moved to and fro in connectic the fire-box, quickly clears it of its ashes; or the can be completely turned from an horizontal to a dicular position in the event of its being required t out the fire entirely. This stove has been introduce cheap article, which it undoubtedly is, and burns ant coal as well as its more expensive and elaborate prot The principal novelty, however, in Mr. Hunt's ex another American stove, intended for any kind of sitt reception room, named the 'Hygiene' Controlled bustion and Ventilating Grate, which is also an anth coal burner, and we should not be surprised to se

principle, with some modifications probably, taken up own manufacturers, as it has many points of recommend We give an illustration of it, which will convey at a its most salient features. It will be observed that retaining somewhat the appearance of an ordinary r grate, in so far that it is intended to be set in th opening and in connection with the orthodox mantel it is completely closed, but has a series of talc panes its front, through which the fire is seen, and that it p boldly into the apartment, thus sending all the heat rated into the room, while securing the inmates fro danger of burning, etc. The external air is brough the usual manner, into a chamber coated with fire-cl is emitted warm into the room through side orifices. fire-pot is circular in form, and like most American is fed through an opening in the top. Around the is a large heating chamber, which effectually war lower part of the room, and the heat given off is i It is so perfectly under control by means of the vent in front, that it need not burn more fuel than an o grate, and it can be regulated to burn twenty-four without attention, at a cost of threepence, and can quently be left alight during the night: in fact there necessity to extinguishing it for months. Thus fro

ic point of view, this stove has everything to recom-
, and the entire absence of dust or smoke from
aughts, in the room, is an advantage all householders

Mr. Harry Hunt's 'Hygiene' Controlled Combustion and Ventilating Grate.

ıreciate; a further sensible arrangement is that
parts that can wear away, or that are likely to
eplacing, can all be affixed without removing the
m the mantel.

r open fire-grate is shown by Messrs. W. A. Martin
, the well-known makers of patent furnaces and
loors, of Pocock Street, Blackfriars. We append

s of it, by which it will be seen that in appearance
les an ordinary register, the bars being of vertical

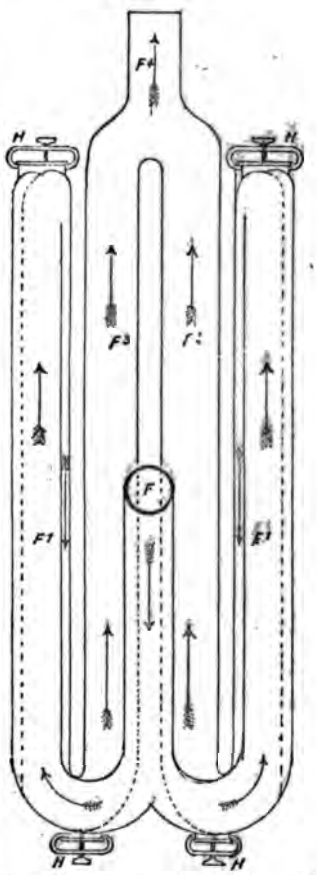
form, and it has the addition of a balanced blower to draw down when coaling takes place or the fire is low. But the principal novelty in this grate is a pair of sliding cheeks, moved to and fro by means of a lever inserted at the lower part of the front on either side, as shown in the next engraving. The object sought to be obtained here is two-fold, viz., reduction of the size of the fire, and for the purpose of adding fresh fuel. The Martin grate is fed from the side and not from the top. When fresh fuel is re-

quired, one of the cheeks is pressed forward, and then drawn back, leaving an open cavity, into which the fresh coals are then thrown: in this position they become incandescent, and emit but a mere particle of smoke, the top part of the fire being at this time perfectly clear. Either or both sides of the fire can be stoked in this manner, but it is preferable to do so alternately. It can be regulated by means of the self-acting blower to burn either slow or fast; and it is also claimed that by the use of a blower no

cowls or other appliance are required at the top of the chimney, and the possibility of down draughts is entirely avoided. It is also claimed that this principle may be applied to any grate at a moderate cost.

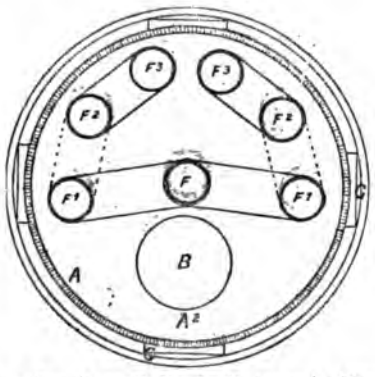
Kohlhofer's Patent Hot-Air Stoves, manufactured and exhibited by G. Haller and Co., 50, Lime Street, E.C., are smoke-preventing, and should be seen by all interested in sanitation, it being claimed for them that, independently of the properties they possess of heating, they act as efficient ventilators. In the accompanying

FIG. 4.



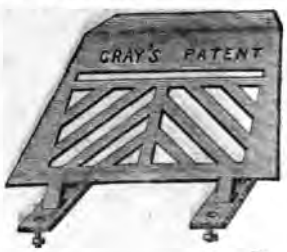
diagram, Fig. 4, the arrows indicate the direction taken by the gaseous products of combustion, after leaving the

FIG. 2.



chamber B (Fig. 2), until they finally enter the chimney. A glance at the plan, Fig. 2, will show that a considerable heating surface is presented to the cold air enteri bottom apertures of the outer casing surrounding t and which is thoroughly warmed by the time i and passes out of the apertures at the top. But the adaptation of this patent to our Register St its advantages as a ventilator are conspicuous, when of setting the grate in solid brickwork, it is fi casing made of bricks or iron exactly similar to jecting part of the wall or chimney breast as at used, which contains the flue leading to chim this casing the same system of flues is adopte scribed above in the hall stoves, and in addition ings at bottom, admitting the cold air from ro emitting it again heated at the top, a cold air duct co with the outer air is introduced at back or side, ab feet higher than the lower openings in front; wh becomes warmed in its turn, and passes through th apertures, thereby causing the vitiated air to be dra the fire and up the chimney. The apertures can at a be easily closed, and arrangements may easily be m transmitting any surplus heat to adjoining rooms.

Mr. J. G. Gray, Sudbury, Suffolk, shows a appliance for attaching to any ordinary open fire-gr assist in diminishing smoke. It is simply a false ba forated with round holes, is made in various sizes t it to different grates, and is merely placed in the fire- and secured to the bottom grating by means of two This secures a small chamber behind it, to which a obtained by the air, through a portion of the bars fire-basket. The false back is placed at such an ang it projects the fire well to the front, and the air that into what we may term the combustion chamber



becomes heated, and streams through the sides an the fuel, and helps to separate the gases and promote bustion. The advantage here claimed is, greater heat a smaller consumption of fuel, and a considerable redu in the quantity of smoke produced. This little appli can be purchased retail at prices from 2s. 6d. to according to size, and will be found most useful a intermediary, particularly for the class of grates t found in the great mass of smaller houses, which we expect will remain in those tenements for the prese least.

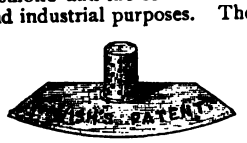
Messrs. Archibald Smith and Stevens, Leicester Sq whose innovation in the form and arrangements of orthodox register grate was introduced to the p when their new patent called the "Wonderful" grate peared, are present with four of them, which are made to burn any kind of fuel, the original it wi recollected, having been confined to the use of anthrac

ıl. We annex an illustration of one of the newest ınd a few remarks upon their general character. hibited are each slightly different in their details, l tending to the same end, viz., that of consuming They are self-feeding, holding, in some instances, fuel for forty-eight hours' consumption, which soon becomes red-hot, and the air passing through it attains sufficient heat to cause it to thoroughly mingle with the gases from the fire, so that the noxious products (if any) are reduced to a minimum, while the currents so formed have rather a tendency to send the heat out into the room; and the fact of the plate covering all the apertures

ımatically on the fire basket (the latter projecting room, and thus giving the whole of its heat to the ıt); and it has two distinct draughts, the one direct himney, and the other communicating with it at of the fuel chamber. By these means the fire can ıred at pleasure, the drawing to and fro of a knob e only exertion required. When direct up-comɔn with the chimney is maintained, it becomes a ow combustion grate, and when the back draught ıt into action, a bright and glowing fire is quickly

From an economical point, they recommend es to all those who study that important feature, anthracite coal, it is confidently asserted by the ; that the "Wonderful" grate only costs at the ıe penny for fuel for six hours burning. Although now several grates in the market constructed on ng principles, we believe this was the first intro-ıbodying that desirable end, and there are other its conception that are decidedly original.

Vavish Fuel Economiser Company of 110, Cannon C., show a simple and useful contrivance for the ɔn of smoke and the economisation of fuel, both ɜstic and industrial purposes. The following dia-



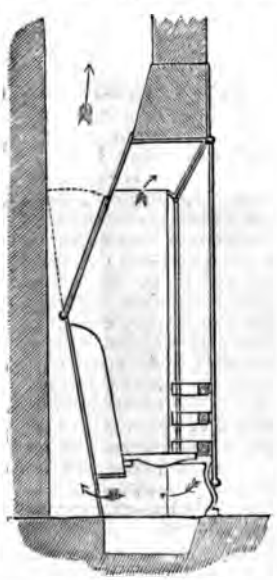
ɔws the former. It consists of a stout wrought-ɛ shaped to the bottom of the grate; in the centre . hole is drilled, over which a capped cylinder is h vertical slots around the top of it. The cylinder at the bottom of the grate, tends very much to the economisation of fuel.

The old-established firm of Brown and Green, Limited, of Luton, Bedfordshire, and Bishopsgate Street, who have always been well to the front in improvements in stoves, grates, and kitchen ranges, show by their exhibit that they are well alive to the requirements of the times, and ready to aid the Committee in furthering the movement they have inaugurated. They exhibit, amongst others, a new smoke-consuming kitchener, a register grate modelled upon similar lines, called the "Kensington", and another named the "Luton". It is rather unfortunate that a similar name, the "Kensington", has been adopted by two firms for new grates, exhibited here for the first time. Messrs. Brown and Green have no engravings of the new grates we have mentioned—we can therefore only publish a short description of them. Both the smoke-consuming kitchener and the Kensington register are fed with fuel from the front at the bottom, consequently the whole of the smoke has to pass through the red hot coals above, and must be consumed in its upward passage. To effect this desirable end, the means employed are of the most simple character. No mechanical action is used. A small trough or open box is attached to the front, below the bottom bar, into which the coal is placed, and this is pushed forward with a hoe-shaped feeder. No back chamber, or anything beyond what we have mentioned, is necessary to consume the smoke, and the results obtained are of the most satisfactory character. These remarks apply to the burning of bituminous coal. If anthracite coal is used, it is supplied in the ordinary way from the top, the absence of smoke in the constituents of this fuel rendering feeding from the bottom unnecessary. On the appearance of the drawings of these grates, we purpose

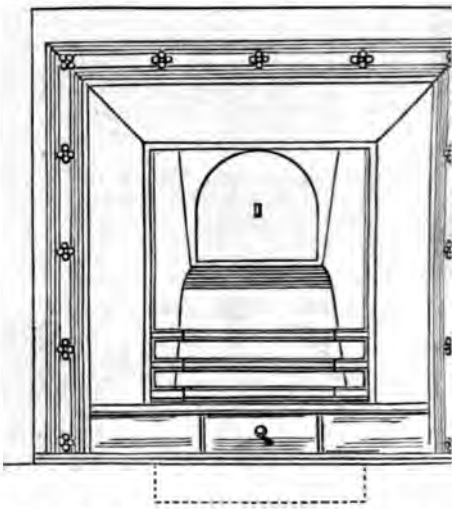
giving a detailed description of them. The "Luton" register is recommended for burning anthracite coal or coke. The bottom grate is made circular, which increases the area of the space for the admission of air to the fuel. The flue is at the back, the mouth being near the top of the fuel, and it has a protecting brick in front. It is provided with a damper, which regulates the opening to the flue, and gives perfect control over the fire, which can be made to burn freely or slowly, according to the distance it is opened. The "Times" portable cooking stove, also exhibited, is one of those that burn anthracite coal with perfect freedom, and is consequently smokeless. It is of the ordinary character, but by the arrangement of the bottom grate the fuel is always thrown forward, and presents a cheerful appearance however small the fire, and facilitates roasting in front. It is also recommended by the firm as an unfailing cure for a smoky chimney, and a great saver of fuel. The "Twin" smoke-consuming stove is also amongst the exhibits of the firm, but as this is generally known, it is unnecessary to enter into a detailed description. It is sufficient here to say that it is constructed to burn either anthracite or bituminous coal, the action being changed with the use of either, though each appears to effect its object equally well, and one advantage appertaining to the "Twin" stove is, that when two rooms are close together, the fire may be in one, and the warm air generated in the other. Messrs. Brown and Green's exhibit is well worthy the attention of visitors.

George's well-known Calorigens, manufactured by Messrs. J. F. Farwig and Co., of 36 Queen Street, E.C., which have already been noticed in the columns of the SANITARY RECORD, are shown in various sizes both for gas and coal, the latter burning either anthracite or bituminous. The important feature consists in introducing the external air, and causing it to pass in a coil through a heated chamber; by this means it cannot possibly be superheated or burnt. Thus a continual current of warm fresh air is circulated throughout the apartment, assisting notably in its ventilation.

A simple but ingeniously constructed grate is that known as Crane's Patent, of which we gave a detailed description in the SANITARY RECORD in connection with the Medical and Sanitary Exhibition; it is exhibited by Messrs. Deane and Co., London Bridge. The accompanying illustration, which represents it in section, shows

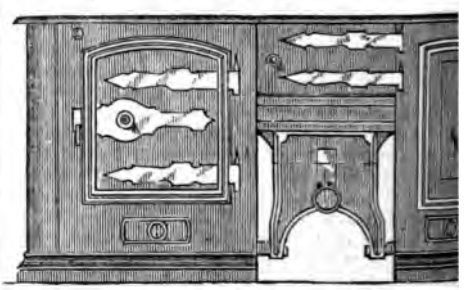


its action clearly. The fire-box is formed of fireclay lumps, so constructed as to form flues at the side communicating with the bottom of the stove. By closing the register door, which is fitted in the usual a strong draught is created, conveying the pr combustion down the side flues and directly u fire, and, for the most part, again drawn thr the remainder being carried into the chimney an opening below the level of the fire. When t



well alight the register door may be opened, anthracite is then burned as in an ordinary grate foregoing remarks are equally applicable if bitu coal is used, as, from the products being conveyed u fire, they are practically consumed before enteri chimney. Its front elevation is in all respects tha ordinary register grate.

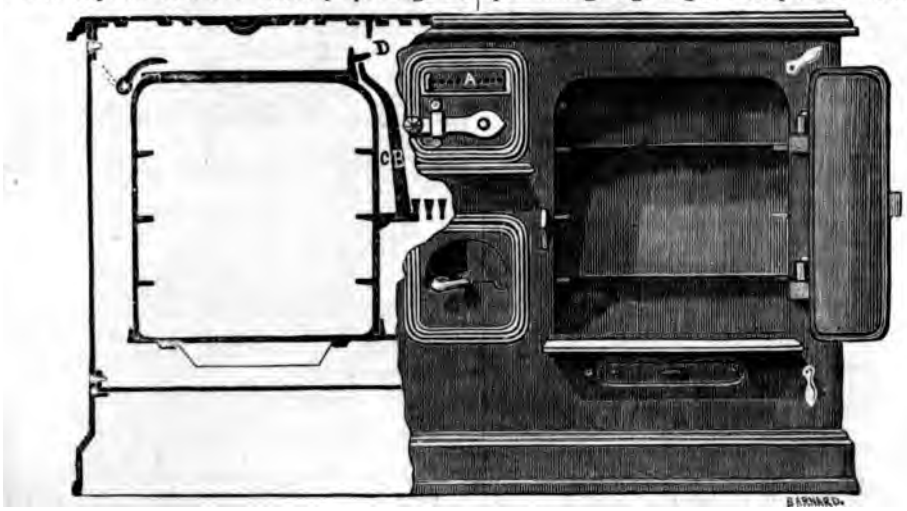
Messrs. J. and J. McMillan, Scott Street, Port I Glasgow, exhibit a new appliance that may be atta any kitchen range, tending to render it smokeless; sists of a box hung between the oven and boiler, a in the subjoined engraving. By means of a lever i



at the side, this box is drawn forward at a certain ang the same time a solid plate, fixed at the back, passe the lower part of the grate and prevents the fire f through. Fresh fuel is now inserted in the box, an returned to its original position; the lever is now in in the front, and the fuel resting on a solid plate is f upwards into the fire, and by this arrangement a comm class of fuel may be used, costing less than ordinary h hold coal. Burning from the top downwards, it insu bright fire with full command of heat, and combu being slow, a decided saving of fuel is effected. Bu more important feature, which will no doubt have rec to the reader, is that all the gases from the green coal to pass through the fire, and must necessarily be ignited and destroyed, thereby preventing smoke being formed. Perfect regulation is provided for, s a slow or quick heat can be obtained at pleasure. apparatus can be applied to nearly every descripti existing kitchen grates and cooking ranges, and a fi

ge it claims, which the cook will readily appreciate, he top of the range or hot plate has in no way to rbed by the removal of vessels upon it for the purpose nishing the fire. One further advantage we see in ngement is that if the fire is low, and is suddenly for boiling or stewing, etc., it can be immediately to the top, and so throw off the whole of its heat purpose in view. We understand it can also be to heating stoves for halls, churches, conservatories, s yet this adaptation has not been applied to a oom grate, but there are numbers now in use to t appears to us to be perfectly applicable and with ge as regards the prevention of smoke and saving

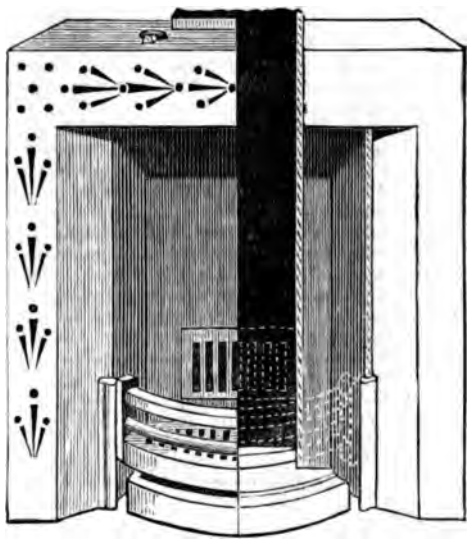
Wilson Engineering Company, High Holborn, make display of their Patent Smoke-Consuming Ranges, h the accompanying illustration is an example. We often called attention to the value of these ranges sanitary point of view, that we cannot add much to ner descriptions of them. Broadly speaking, the



e exemplified here is to admit air from all available and by sending it around the ovens in connection fire, produce an intense heat, attack and destroy ke, by separating and consuming the gases evolved, ging the unburnt carbon into a sheet of flame. Improvements have been made by perforating the the opening leading to the fire-box from the hot the top with small circular holes, which draws in lerably increased quantity of air, and mixing with ducts that have already passed around the ovens, still further promote a perfect combustion. A dvantage is obtained in gaining an increased heating at the back, by arranging a series of gills, over he heat has to travel and is arrested in its progress. st-class medals have already been awarded to this

invention patented by Mr. Jno. Cornforth of Ber- eet, Birmingham, for consuming smoke and saving ally does what is claimed for it. The principle is n connection with the cheapest of open fire-grates, tage or laundry stoves, so that there is no reason r humblest dwellings may not in the future conduce nsiderably to the public comfort. The fact that e-consuming grate, and consequently a coal-saving a be purchased at so small a cost commends it to all, doubtedly the thanks of the public generally are he inventor. The patent is adaptable to all kinds aces, muffles, brewers' coppers, etc., and is being r various manufacturers in different parts of the n. The fundamental idea, which is the same in all ions of it, is that the bottom bars are formed s, or hollow bars; the ends of which enter an iron with chambers to receive the heated air from each, and when freed meets the unconsumed gases which arise from the fuel; thus perfect combustion is attained.

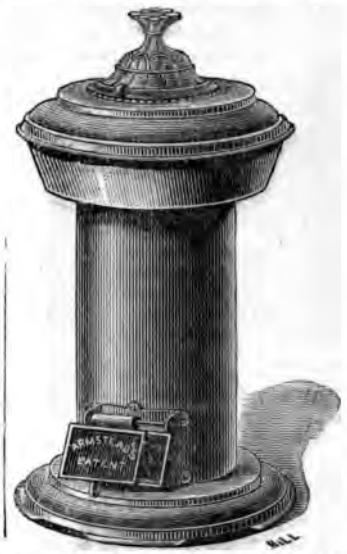
Amongst the private persons who have introduced new inventions at this Exhibition, we may mention Dr. Moore, of Haroldean, Thornton Heath, who exhibits an open register for burning the smoke of bituminous coal, or the little that emanates from anthracite coal. It is lit in the usual manner, but the entrance to the flue is at the bottom of the fire basket at the back instead of above it, and the space below the bottom bar of grate is enclosed. The draught, therefore, is through the front of the fire, which, broadly speaking, burns downwards. The enclosed space at the bottom forms a hot-air chamber, and to make the grate a ventilating one cold air can be admitted from the outer atmosphere, and regulated as desired, and emitted into the apartment in the usual manner. From the fact that the fire burns downwards, and the hot-air chamber underneath, the main products of combustion are consumed before they enter the chimney, but the lighter portions pass through a grating at the top of the fire basket into the flue. Dr. Moore contends that by this arrangement no more air than is necessary for ventilation passes into the chimney, and that it consequently prevents a draughty condition to the house. So far as we have seen, the fire burns



freely and in accordance with the argument of the inventor; and it is the only one on this principle in the Exhibition.

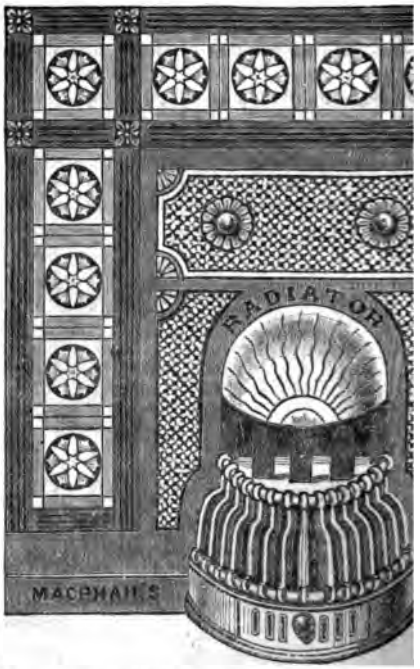
If, under the official tests, it is found to answer its purpose as well as we are assured it has done in private use, it will open up a new feature for consideration in connection with smoke-consuming grates.

Mr. R. W. Crosthwaite, of 153, Queen Victoria Street, exhibits his well-known stove for heating halls, public buildings, etc. The important feature of these stoves, the bodies of which are strong sheet cylinders, fire-clay lined, is the taking the flue completely round the top of them before it is admitted into the chimney. This may not improve their appearance, but it is more than compensated for by the extraordinary amount of heat obtained. A ventilator is provided, by which the draught is so regulated as to enable them to burn a short or long time without attention. A copper is constructed on the same principle, excepting that in this case the flue is taken twice round it



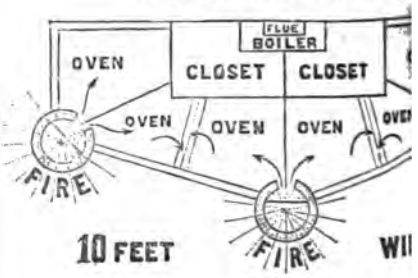
before entering the chimney, boiling the water in a very short time, and consuming very little fuel. The ranges, both portable and for setting, made by this firm are well known, the speciality of the former being that the flues are so constructed as to enable the heat from the fire to be taken either under the oven if required for baking, or above when required for roasting, by a simple arrangement of the dampers.

The Radiator Range Company, of Cannon Street and Bo'ness, N.B., exhibit the range bearing that name, which we described at length in our report of the Sanitary and Medical Exhibition, held at South Kensington in August. Since then, the Radiator Range has been introduced on a much smaller scale, for the use of cottages and small dwellings, and contains the principal feature of the larger one, viz., a circular projecting fire which throws a great amount of heat into the apartment, and unlike most other close ranges, which it virtually claims to be, presents a good-sized fire, sufficient to roast a joint in front, while containing all the other attributes of a close fire-range. By a simple arrangement of sliding doors, the fire can be partially or wholly closed, creating any amount of draught required. It consumes a large proportion of its smoke, economises fuel, burns coke, bituminous or anthracite coal with equal success, requires no setting, and from its size and shape conduces to economy in building the chimney breasts of new houses where it is intended to be used. The company are also introducing their larger ranges, consisting of two, three, and four fires respectively. By the peculiar circular shape of the fire-box, these ranges can be adapted for placing in the centre of the kitchen. A four fire-range is capable of cooking sufficient food for a thousand persons—the fires in the range being at the four corners, each roasting three joints, while upon each of the four sides are two ovens, with only one centre flue. A
and resting upon part of the hot plate are fo
thus giving to the range four fires, eight
closets, one large high pressure tubular boiler
flue; and, if desirable, four independent gri
introduced (similar to the smaller ranges),
way interfering with the boiling and stew
going on upon the hot plates. The
now introduced for the first time their op



less grate, which contains some origin
The fire-basket is circular in form, and
the room, the bars being quite new in
the exception of a small ash-pan underneat
ket is close to the hearth. It has a fire-bric
spaces to allow the smoke and flame to p
There is also a series of tubes at the 'bottom e
receiving air, heating it and causing it to min
smoke and flame. The cold air is admitted throu

"THE RADIATOR"
SATURN WITH 3 FIRES.



PLAN

of the ash-pan, passes through the fire, up the
tioned, and is discharged over the top through
slits or sprays, so formed that it shall radiate
At the back of the tubes is a row of gills, and
municate with an elongated chamber or pocket,
ventors term it, open only at its lower end. Th
the heated air mingling with the smoke and

good combustion, and tends materially to consume moke at this stage. These now pass through the ices in the fire-brick back and tubes, becoming more heated at every step, into the pocket at back, which essarily an intensely heated air-chamber, and by this he carbon is mainly consumed, and passes downwards opening communicating with the chimney, where it s as a body of mainly spent heated air. Another por- f heated air is sent through to the pocket from the n, where it meets the smoke or flame, and completes ork of combustion, should the other have failed to ally consume the whole. Another novel feature in rate is a sliding hood, which can be brought forward ost a level with the bars. In this position it may be o perform the functions of a blower, and creates an e draught. When this blower is drawn forward the ey is entirely open, but as it is thrown back, a plate, ed to it at an oblique angle, partially closes the ay, and tends to make the grate one on slow combus- rinciples. It is also intended that when required, esh air shall be introduced from the outside, heated, scharged into the apartment in connection with water, ctant fluid, or diluted perfume for moistening the air.

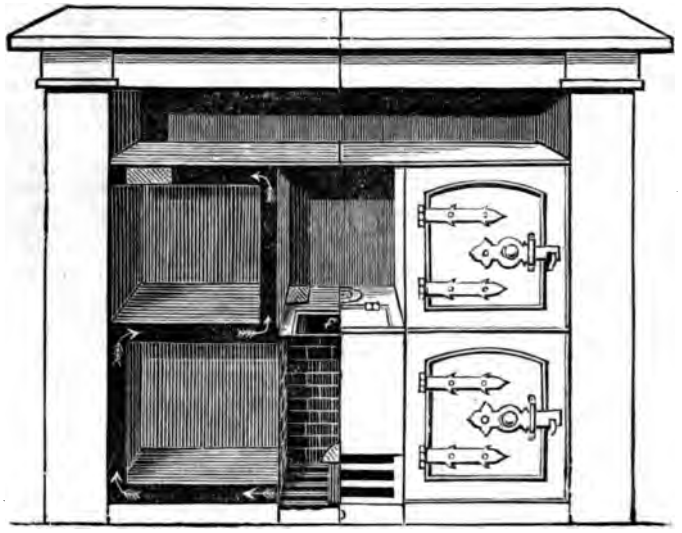
Robert Renton Gibbs, Mill Street, Liverpool, has les of his well-known patent complete Hot-Water ratus for heating entrance halls, private and public ngs, etc., but his hot-water grate for ordinary sitting- will be more interesting to the majority, and per- more noteworthy. The front of this grate presents pearance of the ordinary register, but the back con- f a coil of pipe, so fitted that part of it forms the

ars; by this means water is very soon heated, even a there may be only a moderate fire, and as many as or four bed-rooms can be warmed by a circulation of ater in pipes connected with this coil. A large room, ost remote portions of which would not be sufficiently ed by one fire, can be made very comfortable by a pipe round it in connection with its own fire-grate. rawing-room or hall may be heated from the dining- and it is obvious there are many useful purposes to this simple arrangement may be adapted.

Franz Lönholdt, Architect, Frankfort-on-the- exhibits some elegant independent stoves, suitable lls, churches, public buildings, or even large recep- ooms, which offer the advantage of a pure genial rom the lowest to the highest strata of air in the apartment in which they are fixed, coupled with the most perfect ventilation. Mr. Lönholdt has not brought us stoves of the ordinary German pattern, but he has studied the best points of the American stoves and those of his own country, and introduces to our notice a certain modification of the two systems, that he considered better adapted to English tastes, and that would be likely to find favour with us. They burn anthracite coal in the best possible manner, and are self-feeding, holding sufficient fuel to last from twenty-five to fifty hours, according to size or the degree of heat required to be kept up. This can be regulated at pleasure by a simple ventilator, and to produce moisture each stove is provided with a neat enamelled vessel, so placed as to be out of sight, to hold water or diluted perfume. At the sides of the grate, and between it and the flues at the back, vertical circulation tubes are provided through which pure air from the outer atmosphere is made to circulate, and after passing all around the stove, is admitted into the room; and this too can be regulated at pleasure. The products of combustion are drawn downwards, and circulate around the base before they are drawn into the chimney, and in consequence of this base burning and heating arrangement, and their great circulating and heating power, one of these stoves is capable of being placed in a hall, and of warming a complete suite of rooms, or the entire upper part of a house, in a very short space of time, and may be kept burning the entire winter. They are, like the American stoves, provided with talc panes, through which the fire is always seen, and by a simple movement the grate can be shaken, lifted up and down from the outside, and freed from ashes and cinders without disturbing the fire or raising dust; and it is said they may be regulated to give off a good heat, yet not to burn more

than half-a-pound of coal per hour. Another advantage is that no part of the iron can ever become red hot, as the fire basket, composed of vertical bars, hangs free in the stove, and consequently the circulating air does not become over heated. As to the designs of these stoves, a reference to the accompanying drawing speaks for itself. There are four exhibited, each of different pattern, but all of similar artistic excellence. The castings, from the extensive iron foundries of Gebr. Buderons, at Wessen, are of the finest description, and have not been touched by file since leaving the sand. The proprietors of these productions raise their own ore and smelt it, thus giving them every advantage in production of the great iron foundries of Gebr. Buderons, at Wessen. Some parts of Germany, as our readers are doubtless aware, are celebrated for their superior castings, and in the case of these stoves it is due in some measure to the fact that highly finished brass patterns only are used in the moulding.

Mr. T. Stanley, of Rhyl, exhibits several specimens of close fire kitcheners constructed on the smoke-consuming principle. His patent is for supplying the fuel to the fire by means of a hopper or coal chamber, which projects a little above the hot plate, and is provided with a close shutting lid to prevent any possibility of fumes escaping into the apartment. By this means the gases from the coal have to pass through the fire to the flue, and are conse-



quently consumed, leaving little but colourless vapour to pass into the chimney. The arrangements for heating the ovens are admirable, the flue passing first under, then up the outer side, and over the top to the chimney, which is a great improvement on the old plan of merely taking it over the top of oven, and thence to chimney, and ensures baking being carried on to perfection. The same idea is carried out in the quadruple oven ranges, the four being thoroughly heated with scarcely any additional consumption of fuel. The principle is also adaptable to various kinds of furnaces and bakers' ovens, an example of the latter being exhibited, which appears to be equally effective. Mr. Stanley has also constructed a hob-stove upon similar lines, which appears to be very suitable for breakfast rooms, nurseries, or butlers' rooms.

Another American cooking stove that claims our attention is the 'Greene Soft Coal Cooking Stove' (its Transatlantic appellation), exhibited by Messrs. Charles Churchill and Co., the American merchants of Wilson Street, Finsbury. In appearance, as will be seen by the engraving, it is of the ordinary American type, but by arrangements we shall describe, it is made to burn the ordinary bituminous coal, free from the emission of smoke; at the same time it is not higher in price than other American stoves of similar quality that burn under the old conditions. They are made in various sizes, including extra ovens, boiler, etc., the one illustrated being large enough for the requirements of an ordinary family. Like all other cookers coming from America, it is complete in itself, requiring no setting, the parts being all interchangeable, rendering their renewal a matter of mere ordering from the maker and putting into their proper place, which can be done by any one. The object of the inventor has been (dropping all technicalities of description) to supply to the fuel just that amount of oxygen necessary for supporting perfect combustion, and so compel the gases from the coal to succumb to the action of the heated air, that is discharged into it from all available points. To effect this purpose the fire-box, though in the main but small, is made long and shallow, but as broad as the stove will admit, which enables it to be divided into two parts, making two combustion chambers. This division is effected by a pendent pipe attached to the long centre of the stove. This pipe, which is flattened, passes through each side of the stove, and is open at each en full of holes, ⅛ inch in diameter, on the und number of about one hundred. The grate ba narrow castings two inches wide, filled with one quarter-inch in diameter, and the fuel door in the same manner. The result of this is to s air before it enters the fire-box, which is abso sary in burning bituminous coal, and it enabl be heated more quickly (a great aid to combustic prevent the formation of clinkers by the rush volume of cold air into the fire-box among the in or melted coal. The object of locating the air-c top of and nearly in the centre of the fire-box is a union of the particles of air, flowing in at each and through the perforations, with the hydrocarb

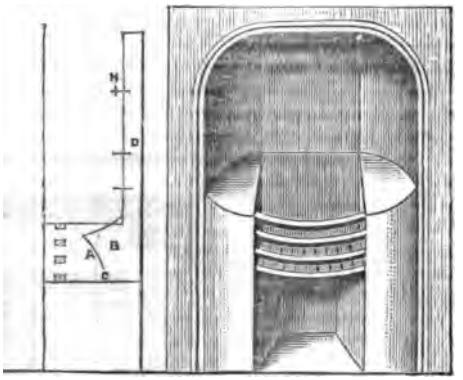
by the heat in the front of the fire-box. This adı heated air with the gases of the coal ignites the continuous and heavy flame, in the back or chamber and beyond, extending at times to the fi oven, thereby securing an intense heat, which wo wise pass away in the usual form of smoke and s front half of the fire-box may, therefore, be calle where the fresh coal is placed to be roasted or coo the result before named. That the action de accomplished, a series of talc-covered openings a of the stove, where the process can be seen, clear strate, and although we are now becoming accustor class arrangement in home manufactured ranges

tion if the idea has been so well worked out as in the 'Greene' stove. A tall heating stove for halls or such purposes, on a similar principle, is also shown, and appears to work with the same satisfactory results. The principle is now being adapted to be fitted to ordinary English grates in the chimney, and grates of that kind will be shortly brought out.

Some ingenious inventions from the manufactory of M. Michel Perret, Place D'Iena, Paris, are shown by Messrs. B. H. Remmers and Co., St. Vincent Street, Glasgow, the sole agents for the United Kingdom, but as they are contained in two sections, we must treat of them in each. The one we are about to describe is an open fire-grate of the simplest construction. The opening is low in height, after the French principle of fire-place, and square in form, and is composed of five slabs of fire-clay, viz., bottom, sides, back, and top, the only communication with the chimney being by a longitudinal opening, about two inches in width, in the front of the top slab. A simple independent fire-basket, standing on legs, is placed in this opening, and as it has no back, but merely front bars and grating, the fire at back rests against the fire-clay. The heat here generated is intense, the top or deflector brick tending much to increase it, and from the narrow inlet to the chimney, presenting a most favourable opportunity of burning the gases before they can enter it, and so producing a smokeless grate. At present, it has been only used with anthracite, but our own opinion is that with the assistance of a blower, which the inventor has provided, bituminous coal can be burnt, and rendered smokeless with a little care. Should this prove correct, this grate will offer one of the easiest means of dealing with the smoke nuisance, as a cheap article in the exhibition. With anthracite, it has been demonstrated that it will burn 24 hours without attention.

A large cylindrical stove of Norwegian make is exhibited by Messrs. Hald and Co., Great Winchester Street; we append a sectional drawing and elevation of it. These stoves are made in six sizes, the smallest being about 6 feet high, and the largest 10 feet. The outer casing is of sheet-iron, and the inner one of cast iron, the fire-box being composed of several independent rings of cast iron, placed in the stove one above the other. The arrows show the direction taken by the external air and the products from the fire. The former which maintains the fire, in passing the rings, carries the superfluous heat from them to the coals, which burn in highly heated air under specially favourable conditions. The fire is easily lighted and regulated, and can be maintained with a very small consumption of fuel. Any kind of coal or coke may be used, as the air has free access to the whole of the interior. No over-heating takes place, as it is only in the upper part of the stove that the fire comes in direct contact with the part that heats the air, which is conveyed into the room, in such a manner that it does not become burnt by coming in contact with over-heated iron. The heating capacity of these stoves is very great, and the dimensions of the fresh air channel are large, making their ventilating power extensive. A small reservoir for water to ensure moisture is placed in the top. Some of them are already in use in England, and, we are informed, are working successfully.

Messrs. Henry and Reeve, 18, Little Marylebone Street, W., exhibit one of those little inventions that we are glad to find have not escaped the attention of inventors, for fixing to any of our existing grates to render them smokeless. The article, which is called the 'Calpean' Smoke Purifier and Soot-Consuming Grate Apparatus, is fitted to the fire-basket at the back; a portion of the back of the grate is removed, and a purifying chamber (so-called) is arranged for. The construction of the apparatus is such, that, as may be gathered from the subjoined engraving, a great draught is created in the lower section, and as access to the chimney in the usual direct upward mode is cut off, all the products of combustion have to pass through the fire to the purifying chamber before mentioned. This is filled with metallic shavings which soon become red-hot, and so to speak, create a second fire, which is wasteless and costless, thereby giving increased heat with less consumption of fuel. But the main object of the purifier may be said to be for the purpose that its name implies, viz., purifying or filtering the smoke, which it does, by burning it and



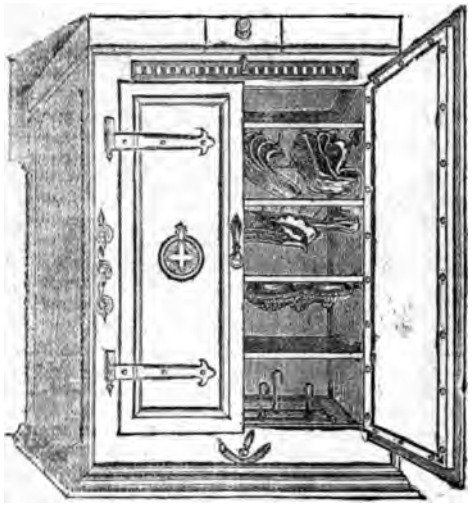
collecting its solid residuum, which after several hours burning will not produce above an ounce or so of a thoroughly burnt or well charred powder. Access to the flue is only obtained by means of an ordinary damper, and by this arrangement, perfect control over the fire is obtained, and the smoke, broadly speaking, is entirely consumed. The general adoption of the 'Calpean' smoke-purifier to existing grates should only be a work of very short time.

GAS APPARATUS AND APPLIANCES.

In this department the Exhibition is fairly represented, several of the leading manufacturers having sent a good assortment of their general goods, amongst which a few novelties are here and there discernible. A new Instantaneous Water Heater by Mr. Leoni, and a most attractive gas fire, are the specialities from this firm; and the adaptation of the Leeds 'faience' or Burmantofts ware, made by Messrs. Wilcock and Co. of the last named place, to gas heating stoves is exhibited by Mr. Wilson of Leeds, a maker of considerable repute in that town. A gas cooking apparatus, shown by Mr. Giles of Blackheath (see page 248), deserves to be more extensively known, and its exhibition here will doubtless secure for it that publicity to which its merit entitles it. All these articles are fully described below.

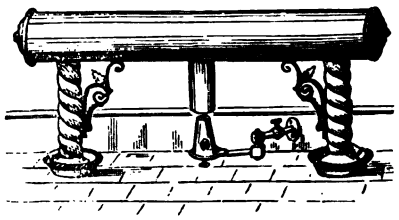
Messrs. H. and C. Davis and Co., Camberwell Road, whose apparatus for heating and cooking by gas, have from time to time been mentioned in the SANITARY RECORD, are well to the front with their specialities. Amongst them we notice an excellent Double Meat and Vegetable Steamer, with large hand-screws to tighten up the doors, and the edges faced over with india-rubber to prevent escape of steam. The capacity of this steamer is one hundred-weight of meat, potatoes, etc.; a good roaster suitable for hotels, clubs, etc., is also shown. There is, in addition, a large apparatus 6 ft. 6 in. high by 4 ft. 3 in. wide, suitable for very large establishments. This is lined with white enamelled iron plates, easily cleaned, and preserving the interior from rust. We subjoin an engraving of this. Both of the above-mentioned have a double casing, and are lined with a non-conducting material, which prevents the outward radiation of heat, and reduces the consumption of gas. The firm have fitted up several of the above in some of the largest business establishments in London with great success. In addition, they exhibit several sizes of their popular 'Metropolitan' Gas Kitchener, so named from its having been extensively adopted, both for sale and hire to their customers, by the South Metropolitan Gas Company. This stove is a most complete cooker for family use, combining large ventilated roaster and baker, hot plate for boiling, stewing, etc., and an arrangement for grilling, toasting bread, etc. It is claimed that full heat can be got up in from three to five minutes, by the special arrangement of

the burners, and the non-conducting material with which they are lined, and that a saving of fifty per cent. in gas is obtained by these means. Other gas companies besides the one we have named, both in London and the suburbs



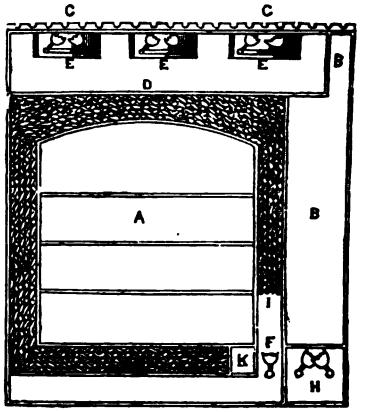
have taken up these stoves, and we understand that one of them has now 450 in use amongst their consumers of gas. The Kyrle Gas and Coke Fire with regenerating chamber, and the 'Sphinx' Circulating Copper Gas Boiler, which were described and illustrated in the last number of the SANITARY RECORD, are also to be found upon this stand, which contains a variety of other appliances, both small and large, for utilising gas for heating and cooking purposes.

An entirely original system of heating is introduced by means of the Radiating Heat Generators for Gas or Oil Lamp, patented by Mr. Gillingham, of Chard, Somerset. It is claimed for this invention that the combustion is perfect, the heat generated is wholly utilised without waste, and is separated from the residue or product after perfect combustion. A glance at the woodcut will

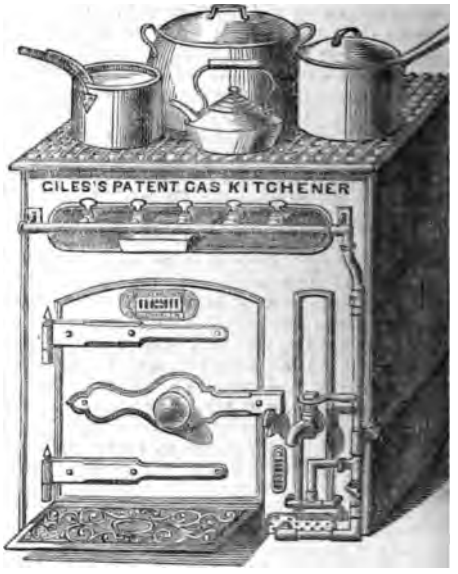


make this clear, the result being attained as follows:— A cylinder (the diameter and capacity depending upon circumstances) raised a short distance from the ground, receives the heat from a gas-burner or lamp by means of a metallic chimney a few inches in length fitted underneath its centre; the ascended heat is thus held in volume aloft in the cylinder, while the residue of combustion, being so much heavier, is carried down the descending tubes at either end upon which the cylinder is supported, in a slightly rarefied condition, and becomes separated into its component parts. The water formed during combustion is caught in the stands (to be sponged out daily). The carbonic acid gas is carried off by product tubes or otherwise disposed of. This is one of the most simple and effective modes of heating we are acquainted with.

A very remarkable Gas Kitchener is exhibited by Mr. Benjamin Giles of 2, Royal Parade, Blackheath and Eltham, S.E., the following being some of its special qualifications. Both the oven and boiler are heated by three ordinary fish-tail burners arranged in such a manner as to create perfect combustion, and cause neither smoke nor smell. The consumption of gas is marvellously s the oven can be heated for baking, etc., water boi boiler generating sufficient steam to cook meat, fis dings, vegetables, etc., at one time, in two large boilers, at a cost of about 1d. per hour. The latt may be deemed incredible, but is nevertheless t whole of the heat being obtained in the manner des



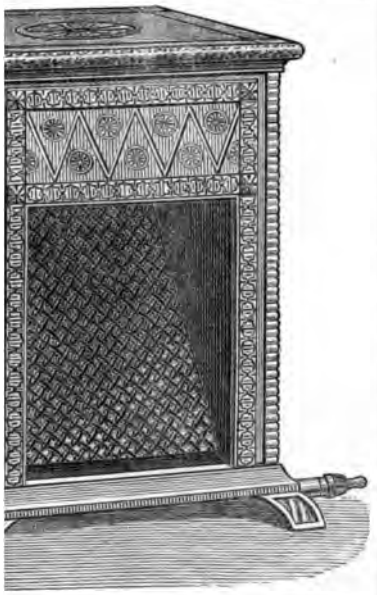
It should be here observed that no gas or fumes ent oven, the burners being placed by the side between i the boiler which is adjacent, sufficient space only allowed to prevent the flames actually coming in c with either surface. The heat thus produced is c into a chamber over the top, down the side and neath the oven, this chamber being filled with a metallic substance in curled strips, that soon the form of an incandescent mass, throwing



intense heat, and, as the side of the boiler also rec the benefit of this, the effect produced is at once appa The burners for the hot-plate are of the same kind, are arranged in clusters of three, surrounded by th metal to prevent the undue spreading and consequent of heat. Each burner is fitted pointing to a centre w causes a better combustion, at the same time a cur air passes between them preventing the bottoms of k etc., being blackened. As a gas appliance this may looked upon as one of the most important apparatus in exhibition.

The town of Leeds, which, we believe, was one of earliest districts to take up the manufacture of gas stood

d in the exhibition, through Mr. Charles
ie most popular makers of gas apparatus
England, and whose productions are not
metropolis; in fact, Mr. Wilson is the
cooking range very similar in its main
l fire range, which has been extensively
School Board officials in various towns.
en strongly advocated by Mrs. Buckton (see
RD for July 15, 1881,) and at the Domestic
s, held at the Albert Hall, it was exhibited
eneral approbation of all concerned in the
iffers from all other gas cookers in so far
rried on in the front, as by a coal fire, and
, in a similar manner. Mr. Wilson has
ciple to effect this purpose, which he has
her stoves for heating purposes, and that
cen up by many of his competitors. It
a slab of fire-clay, over which a network
carried, covered in its turn by a casing of
ire. These are encased in an iron frame
s at the bottom. This forms the front of
range for roasting; the whole mass soon
cent, and effects its object in a most satis-
For grilling on the top the arrangement
ner network of wire is used, and the same
ended to portable heaters for hanging on
s to warm rooms where coal fires are
pensed with, and they are constantly in-
But the newest features exhibited by the
of heating stoves on what is now popu-
e cheerful principle, but with the network
lay slabs before described, one of which
ie body of these stoves, instead of being

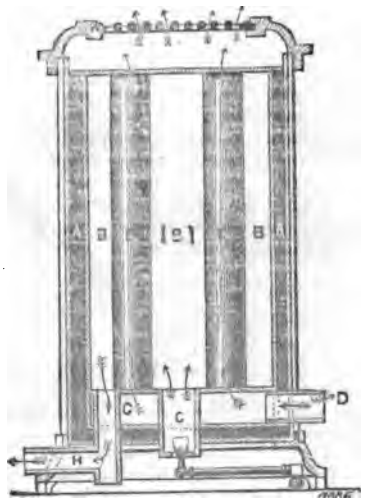


, is made of glazed and coloured terra
Leeds Faïence. This ware, the manu-
. Wilcock and Co., Burmantofts, Leeds,
stined to take an important place in the
uch appliances. It appears to be com-
culiar to the district, for which is claimed
taking a diversified set of colours in
the production of large slabs at a low cost,
tly flat surface. Mr. Wilson has invented
ing the objectionable explosion that takes
g off an atmospheric gas burner, and all
now fitted with what he has named his

vory, Walker Street, Edinburgh, exhibits
ay be used as perfect appliances on a small scale) for heating and cooking by gas by radiation from a small surface highly heated, which is accomplished by means of a 'Bunsen' or atmospheric burner, or an ordinary white flame burner or burners, according to the amount of work required to be accomplished. The invention is at present in rather a crude form, but the principle is apparent. For instance, a small gas burner is made to produce a large heat-giving surface by attaching two plates of iron together, with an interstice of one quarter of an inch pierced with a large number of small holes, up which the flame is conducted, and appears through each of them in little dots of blue flame. In front of this, bread may be toasted, or grilling may be carried on, or it may be retained purely as a heat-producing medium, the area of surface presented, and that becomes the heat-giving place, being considerably larger than has hitherto been attempted with the same amount of power. Another form in which this system is shown is by means of a box or casing, through which an immense number of small rods, about a quarter of an inch thick, are inserted, having one or both ends in connection with the external air, and a portion of their length passing through a small flue or shaft for carrying off the products of combustion. The Bunsen or other burner is applied at an opening at one end of the bottom of this casing, and the heat permeates up and over the whole of these rods, and eventually enters the small flue near the bottom at the other end, and has again to pass over that portion of the rods passing through it; or in place of the rods tubes may be used, open at both ends, through which the cold air enters at one end, becomes heated in its passage through, and emerges at the other end in a warm condition. The invention appears to us to be capable of a variety of modifications, though at present in an unperfected state. There is, however, no doubt that intense heat can be attained by the principle, and the next thing to be considered is how best to utilise it.

Messrs. J. C. Stark and Co., of the Torbay Iron-works, Torquay, make an effective display of their several patented articles. One of the peculiarities of the Gas Cooking Stoves exhibited by this firm consists in the oven or roaster being kept perfectly free from gas fumes, another, that they are thoroughly ventilated with fresh air, and a third, that a white light being used, they are not only free from smell, but it is claimed that a much more intense heat can be established and maintained than in other gas stoves, and that with a much smaller consumption of gas. Their complete Gas Kitchener is a very handsome stove. In appearance it closely resembles one of the modern close fire ranges; on the right is a large and well-ventilated roasting oven, 20 × 18 × 16, over which is a griller for chops, steaks, toasting, etc.; on the left hand side is a large copper boiler or fountain with brass tap, arranged for attachment to self-supply cistern, and on top are several burners for boiling, frying, etc. Their Family Kitchener is similar in construction, with a still larger roasting oven, but without the copper boiler. They also show an assortment of similar Cooking Stoves, suitable for smaller families. Cox's Patent Pure Air Ventilating and Heating Stove is shown in several sizes and shapes, both plain and ornamental, and suitable for sitting and bed-rooms, halls, etc. It differs in principle from most other gas stoves, the object sought being not so much to heat the vitiated air of the apartment in which it is fixed, as to expel it and supply its place with a constant stream of warm pure air drawn from the outside of the house. By this means the air of a room is kept perfectly pure, and all draught is prevented. The smaller size will supply from 900 to 1,000 cubic feet of pure air per hour, at a temperature of 250 deg. Fahr., at a cost of less than one halfpenny per hour; the larger ones, 2,000, 4,000, or 6,000 feet per hour at the same temperature, and at a proportionate cost. An arrangement is provided for carrying off the products to a chimney, and, where practicable, it is as well that this should be done, but perfect freedom from smell is guaranteed without it. The accompanying woodcut and description will enable the reader to clearly understand the construction. A represents outer walls of stove packed with a non-conductor to prevent loss of heat. B, hot-air chamber, in which products of combustion are

stored and re-heated to a very high temperature. C, air chamber. D, pipe for supplying pure air to chamber C. This may be brought either through the wall, the floor, or



ceiling; the latter is preferable, as it has the advantage in summer of converting the stove into a most effectual ventilator, ensuring a good supply of fresh air in the apartment and preventing draught. E, tubes which pass through intensely heated chamber B, conveying pure air from chamber C to top of stove, and discharging it through perforated cover. The air is heated by simply passing through these pipes, and the room may be kept at any temperature required without attention. G, furnace in which burners burn, and which connects upper and lower bottoms. H, outlet pipe for products of combustion. K, one or more ordinary fish-tail burners. Cox's Patent Gas Regulator, which was introduced in 1879, is now generally known and appreciated, having, we understand, taken the first award in every contest since. To enable the public to test its powers to the utmost, Messrs. Stark and Co. shew one fixed on a stand with a gas holder underneath, so that the pressure may be varied, also with a number of lights, and power of shutting off suddenly all but one, proving that the single light left burning is in no way affected. We are informed that the saving effected by using this regulator will average 25 per cent., and as it is perfectly automatic in action, when once fixed it will probably go on for years without attention, unless the pressure is very materially altered from the works, when an extra weight placed upon it will prove a compensating balance. For their Gas Engine, exhibited here for the first time, they claim simplicity and power.

Birmingham is represented in the gas apparatus industry by the noted firm of Jno. Wright and Co., Essex Works, Broad Street, who occupy a large space well filled with the various cooking and heating stoves that have rendered their name so popular. We have on a former occasion given a detailed description in the SANITARY RECORD of some of their leading specialities, and now we have to draw attention to a new patent Hygienic Stove, adapted for burning gas in connection with asbestos fuel, or for coke, coal, breezes, anthracite coal, and slack. The accompanying drawings show the stove in section and elevation and the principle of its construction and working. A is the exterior of the stove. B is a dome of iron above an open fire, divided by a plate, C—the heat and product of combustion pass through the dome over the plate, and into the chimney through the outlet pipe, H. The interior E and F are air chambers or passages, which have a direct communication—in any convenient way—with the outer air, through the continuing pipe, D. When the fire is lighted, the interior of the stove and the dome is heated, and the air in passing abstracts the heat from the exposed surfaces, and is carried through the orifices, G, room; there it rises to the ceiling, and as heavier air is carried off through the fire, the warm air desc replace it, and thus a perfect circulation is induc

the room is equally warmed in every part with pure atmospheric air. Messrs. Wright and Co. have prot the largest assortment of gas appliances designed for ing and cooking of any house in the trade, from the simple and inexpensive to the most costly.

The Portable Gas Apparatus Company, 47, Mill Street, Westminster, S.W., shew their Portable Gas chines, which have been in successful working in co mansions, churches, etc., during the past five years. are made entirely of cast-iron, copper and brass, no metal being used in their construction; are perfectly acting and self-supplying, and the production of the being regulated by the consumption, require no atte after they are started; there is no danger in working, and may be managed by an ordinary servant. The gas m factured by this apparatus is suitable for all purpos which coal-gas is applied, but is much purer, giving o sulphur or ammoniacal impurities, and does not con so much oxygen from the atmosphere.

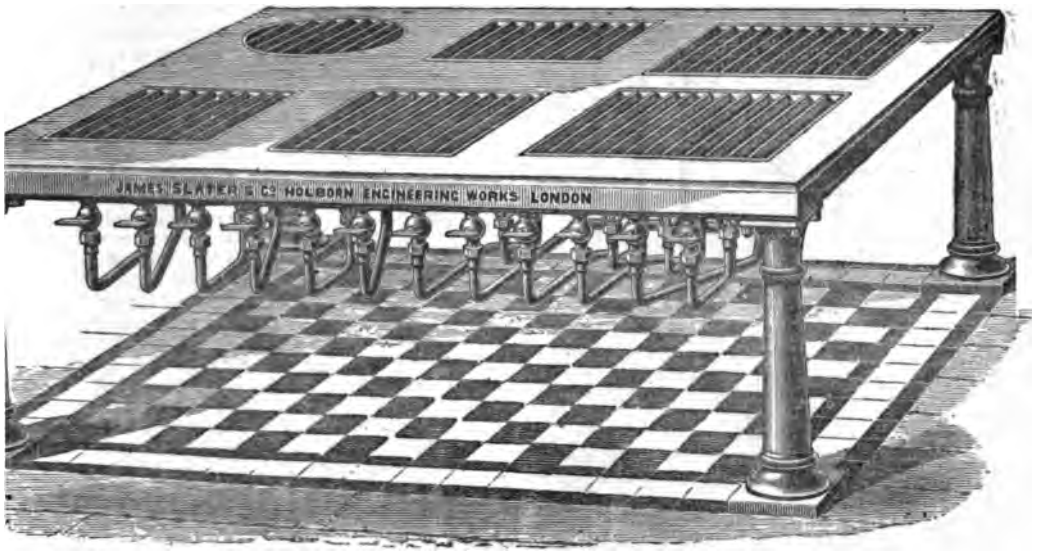
Messrs. Browne and Co., of 186 Piccadilly, W., ha good assortment of their gas cooking and heating stoves, spicuous amongst them being the 'Kensington' Kitch This consists of one of their roasting and boiling st to which is attached an open fire-grate for burning coke gas on Dr. Siemens' principle, which, besides having cheerful appearance of a coal fire, impossible in ord

ges, also heats a spacious oven and boiler, the whole n a portable form, and taking up the least possible t of room.

irs. Slater and Co., High Holborn, exhibit their ous Gas Ovens, for roasting and baking; the former ghly cooking 400 lbs. of meat at one time, and the baking 150 loaves. These apparatus being jack- ith mahogany, prevent the radiation into the kitchen nsequent loss of heat, and adds considerably to their

J. Stott and Co., Vernon Works, Marsland Street, Oldham, exhibit their well-known Self-acting Governor, which has been so long before the public as not to need any comment.

Messrs. Billing and Co., of High Holborn, are present with a good assortment of their cheerful and other reflector gas stoves, ornamented with *repoussé* work, for which the firm have become noted. This ornament adds very much to their appearance. Messrs. Billing are extensive makers



ance. The gas hot plate, standing upon legs at a ient height from the ground, made by this firm is eful for hotels or public institutions, being, as the ing depicts, a mere table, the entire space under it it liberty for any purpose required. By the arrange- of the burners a single egg may be cooked at the ifling cost, yet, when necessary, sufficient heat may ined to cook for hundreds of people.

'Lux-Calor' Hygienic, Condensing, Heating, g, and Ventilating Gas-Stoves of the well-known Messrs. Ritchie and Co., St. Swithin's Lane, E.C., n in various sizes and patterns. These stoves have lescribed in detail upon other occasions in our s, and we can only now add that the reputation they

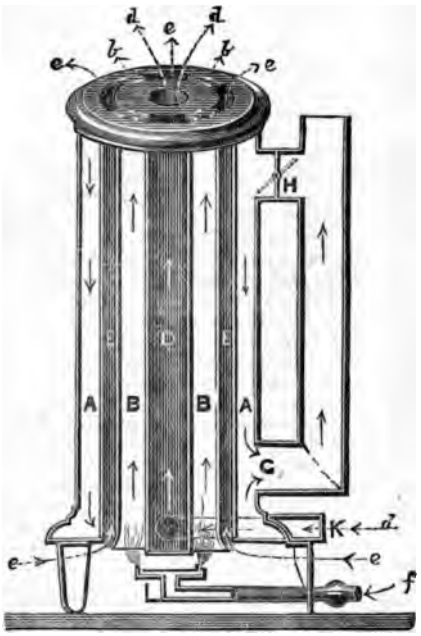
gained for purity of combustion, etc., is not likely o be lost, and as a proof of their condensing pro- and non-giving off sulphur or other poisonous fumes, e display of exotics are interspersed amongst them, lemonstrating what has been justly urged in their , that they are admirably adapted for heating conser- s.

of gas cooking stoves, which are known by the name of the 'Sun-dial', their trade mark. They are made upon the reflector principle, the gas being above the viands, and the heat reflected downwards.

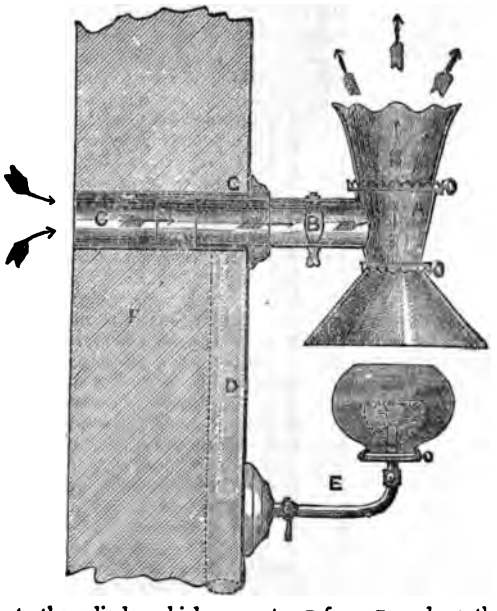
Tait's Thermic Ventilator, manufactured by Messrs. Taunton and Hayward, Heneage Street, Birmingham, is a simple, inexpensive, yet undoubtedly effective apparatus, and should be noted, not only by sanitarians, but by the public generally. It consists of a shaft four or five inches in diameter, the bottom end being open, and raised a few inches above the floor; inside this a gas jet is burning, and a little above it a pipe is fixed, introducing the external air, which is made to circulate about the shaft in another chamber, by this means it is admitted into the the apartment at a genial temperature, the burnt air in the shaft being carried into the chimney or elsewhere.

The Sanitary and Economic Supply Association, Limited, Gloucester, the exponents of Dr. Bond's system of Gas Heating and Ventilation, are present with the Euthermic Gas Ventilating Stoves, Burners, etc., the inventions of that gentleman. The Euthermic Stove is not altogether a new invention, but has lately received some improvements. It is designed for the purpose of introducing a continual supply of fresh warm air with the least possible consumption of gas, the products of combustion being carried away so as to comply with the conditions of healthy ventilation, the warm air being neither over-dried nor over-heated. The appended sectional engraving illustrates the principle carried out in one of the smaller of these stoves. The exterior of this stove presents a convoluted metallic cylinder, exhibiting a large amount of surface for the internal absorption and external diffusion of heat. Within this cylinder are three others concentrically arranged, so as to divide the interior of the stove into three chambers, viz., an outer one A, a middle one B, and an inner one D. Between A and B is an annular space E, which is open both at top and bottom, for the entrance and exit of air, *ee*, from the room in which the stove is placed. The outer chamber A is closed at the bottom, but communicates at the top with chamber B by the four channels *b*, *b*, etc.; it also com-

municates with the flue by the alternative outlets G and H, the latter outlet being provided with a throttle valve, and the arrangement being of the same kind and for the same



objects as in pattern A stove. The central chamber D is open at the top, but closed at the bottom, except for an aperture which communicates with the inlet K, by which it may be supplied with fresh air from without, as in the case of pattern A. Chamber B is open at the bottom, and receives the heated products of combustion direct from the burner L; these pass up it, distributing their heat on one



side to the cylinder which separates B from D, and on the other to that which separates it from E. The heated products, having thus been deprived of a considerable portion of their heat, pass by the four channels, *b*, etc., into the outer chamber A, whence they may escape by H, if the throttle valve be open, or by G if it be closed, giving up a still further portion of their heat to the outer convoluted cylinder. The principle here sought to be enunc great efficiency in heating from a given amount o tested by the temperature at which the products bustion can be made to escape from the outlet of th compared with that at which it would escape but economising arrangement: combination of the result with practical adaptation of the stove varying conditions of pressure at the outlet, by mea alternate arrangement which allows of the products bustion being discharged at temperatures which are to meet these varying resistances: the adaptatio stoves to act as efficient ventilating agents, by introc continuous stream of fresh warm air into the ro freedom from any possibility of explosion, in cons of the burner being practically outside the sto capability of the burner for other heating purpos feature making it especially suitable for bedroom t the Euthermic water heater, which is of the instan water-heater class, it is claimed that economy of obtained by the amount of water heated, per unit as compared with other heaters sold at a corres price, besides great simplicity of construction (ev being readily accessible for examination) being alm possible to put out of order, freedom from explos the adaptability of the burner for heating water o liquids in small quantities in independent vessel required. The Euthermic gas burner which i shown combines a high heating power compare others offered at the same price, and the impossit its 'burning back' with the protection of the ga which this result is obtained from direct contact w flame. The Euthermic Ventilating Bracket, which illustrate, is adapted for the admission of fresh air fr outside in such a manner, that no draughts are cause that the cold in-current is warmed by being mixed w products of combustion of the burner, and the red by this means of the over-heating of rooms by gas. This arrangement may also be applied as a simple an venient form for introducing fresh air at any time wh gas is not alight. Dr. Bond's inventions having thoroughly studied upon scientific principles, are well w of consideration.

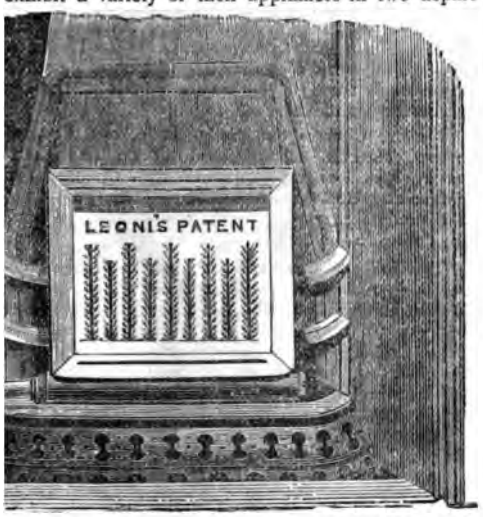
The Silber Light Company, Whitecross Street, send a pretty assortment of their Mineral Oil S

amongst which will be found several of their new R Ceramic Heaters, the principal features of wh

ıted and described in the last number of the SANITARY RD. As oil-stoves, they are undoubtedly among the onstructed class, and burn under the most favour- ɔnditions. Mr. Silber has proved himself one of the expert inventors of burners, both for oil and gas, of esent generation, and his new Argand and 'Silber rdia', both for gas, are probably two of the best that yet appeared. The Argand, which we illustrate, is entirely of brass, and is formed of four concentric two internal and two external to the light. It gives equal to twenty-two candles, burning only five feet per hour, as against twenty candles, which the best ucted Argand burners are supposed to give. It is upplied with a new automatic regulator, which pre- flaring. These regulators can be supplied to burn five, six, or seven feet per hour, different sized eys being supplied with each. These burners have subjected to very severe tests on different occasions, ith corresponding success. The improved Silber rdia, as the drawing will explain, is a flat flame r, that has recently received an excellent improvement construction. As a duplex burner, it is now supplied small attachment in the shape of a valve or lever, in the illustration. By raising or lowering this

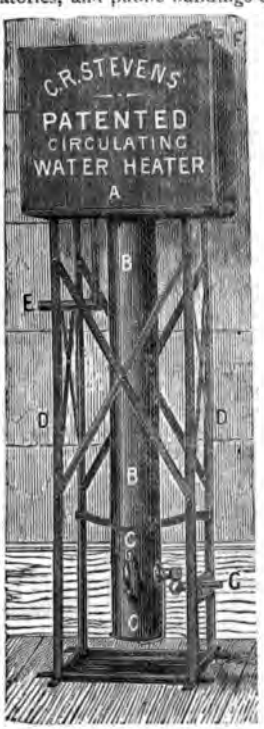
it shuts off the supply of gas to one of the two taps, g the other undisturbed in its light. By this arrange- a reduced consumption of gas is effected, and we have of that flaring, or smoky light, seen in ordinary duplex rs when the gas is turned down. The company also it a variety of table and reading lamps fitted with their cnown burners for mineral oils.

ssrs. Leoni and Co., to whose excellent gas apparatus ANITARY RECORD has from time to time given publi- exhibit a variety of their appliances in two depart-



s of the exhibition. Mr. Leoni has allowed the refresh- contractor to make use of any of the 'cookers', which are exhibited near the refreshment department for this purpose, and most of the viands supplied to visitors are daily cooked in these stoves; but on the present occasion, however, we have to draw attention to the novelties the firm exhibit for the first time. One of these is a new Bath or General Water Heater. Used for the former purpose it is capable of heating thirty gallons of water in 15 minutes to 140 degrees Fahrenheit, consuming only fifteen feet of gas, or two gallons a minute. This heater commends itself for the simplicity of its construction, which, for obvious reasons, we are requested not to make known; we can, however, confidently assert that there is no danger whatever to be apprehended from its use, and there are advantages attaching to it that we consider can be claimed by no other instantaneous heater. Mr. Leoni's newest idea is embodied in a Gas Fire of novel yet most effective design. We append an engraving of it, and may say that it is composed of a slab of fire-clay fitted into a frame; the clay contains a row of vertical narrow openings through which a fringe of asbestos appears. The burner is carried along the bottom, and is composed of a tube with one continuous narrow slit nearly the whole of its length, consequently we have a solid blue flame (the burner being on the atmospheric principle) along the front. This soon heats both fire-clay and asbestos, making the whole an incandescent mass, the heat given off from it being intense. The framework of these stoves is nickel-plated, and has a brilliant appearance; they are intended for hanging on the bars of a grate, or they can be constructed in such a manner that they may be hung on a wall with perfect safety. They certainly form the most attractive gas fire that has as yet been introduced.

The Patent Steam and Hot Air Heaters, exhibited by Mr. C. R. Stevens, of 56, Loampit Vale, Lewisham, are constructed to supply a great amount of heat with a small amount of fuel, which they unquestionably do. They are made in various sizes, being suitable either for private houses, conservatories, and public buildings of any descrip-



tion. The construction of this appliance is as follows:— A small quantity of water is kept supplied to the copper reservoir, above the gas or lamp inside the iron casing, by a supply cistern, with a ball valve to regulate the supply, or a self-acting reservoir with stand, which is connected to the heater by a pipe, and, when lighted, the heat from the

lamp, gas, coke, or coal causes the small quantity of water to be generated into steam, and the heat from the fuel, together with the steam, is driven through the under, and back again along the top, pipes, from which is carried a small pipe to the chimney to take off the particles of combustion. The advantages of this apparatus are, that there is no danger from explosion, as there is no boiler to burst, and very little attention is required to keep it going. All danger of having the hot air burned is entirely guarded against by the admixture of the steam. A reference to the accompanying diagram will show A to be a galvanized tank for holding hot water; BB, iron flue casing and copper boiler inside; CC, gas burner; DD, iron stand for supporting tank and boiler; E, outlet pipe from tank, for supplying water to any part of the house; F, cold water connection; G, gas connection. The whole of the apparatus is connected together ready for fixing, and can, therefore, be fitted to a house by the builder, and cased in with wood, with a door in front for lighting the gas.

ANTHRACITE AND OTHER FUELS.

The exhibits of anthracite, bituminous, and smokeless steam and other coals, together with various patent fuels comprised under section E are fairly good.

In this space the stand of the Anthracite Coal Company, Limited, figures very prominently, they having on show no less than twenty specimens, each differing in some points from the other, though all come from the pure anthracite bed. These are admirably arranged, with cards attached to each kind, pointing out their respective features, the seam or vein obtained from, the purposes they are most suitable for, etc., etc. The result of an analysis of this coal produced by the Company is as follows:—

Carbon	92.27
Hydrogen	3.58
Oxygen and Nitrogen	1.80
Sulphur	0.63
Ash	1.67
	99.95

This analysis speaks for itself, and when it is borne in mind the expense is less than best bituminous coal, inasmuch as about 25 per cent. less in quantity is required, or in other words, that two tons of anthracite will go as far as three tons of ordinary coal, the economy is very apparent. Drawings descriptive of anthracite coal-breaking machines, as used in America for reducing it to all sizes, are also shown, as well as plans of suitable appliances for promoting perfect combustion under steam boilers. Further particulars may be had, or specimens seen, at any time, by applying to Mr. Stobbs, the Secretary of the Company, at 10, Victoria Buildings, Victoria Street, Pimlico, S.W.

Amongst the fuels exhibited is that of the Melincrythan Company, Neath, who send a collection of their prepared wood charcoal for cooking purposes, which they claim may be advantageously used in this country as a substitute for coal, being sufficiently reduced in price to compete with that article. Attention is called by the Company to the clearness of the atmosphere in France, which may fairly be claimed to exist, in a great measure, from the large amount of charcoal used, which gives off no smoke, and makes a very hot bright fire.

Wayne's Merthyr Company, Limited, whose London address is Bartholomew House, Bartholomew Lane, E.C., send a block of coal from their collieries in South Wales. This coal is of smokeless character and of high calorific power. This feature has caused it to be largely used by the government for the Navy, by the various ocean going passenger steamers, and by manufacturers and railway companies, where prevention of smoke is a desideratum. It is claimed to be eminently suitable for household purposes, and that there is no reason why it should not be extensively used in that direction in ordinary grates. It appears to be used exclusively, in the district in which it is produced, for household purposes, and we may fairly assume that if that little extra attention at first lighting, at times necessary, be given it, there is no bar to its general u and its advantages over bituminous coal, in the inestima blessing of 'no smoke'. With the improved grates n in existence and that are constantly being invented, may hope to see this coal, and others of a kindred chara in general use here.

Another interesting fuel to be observed is the Edf Briquettes, from the Edford Colliery, Holcombe, Stratt This is quite a new invention and should be extensiv known and used by sanitarians, those connected with Public Health Department, and all who are interested the success of the smoke abatement nuisance; as places within reach at once an almost smokeless fu offering several advantages over ordinary coal, and a lower price. Like some others of a similar charact it is made in the form of bricks; consequently, it c be easily stacked and takes but little room. This f contains no pitch or tarry matter which is the comm objection to patent fuels. It emits but little smok and what is given off resembles that from woo Black and yellow flames are absent, and noxious gase are not given off. One ton, it is said, will generat more heat than a ton and a quarter of coal, and two of the briquettes, costing about one farthing each, broken into pieces, will burn for about twenty-four hours without attention. It does not crack or explode as some coals do, or throw off sparks, consequently may be said to be safer in use. At the present time its price at the Colliery is 11s. 8d. per ton containing about 500 briquettes, and it is well worth the attention of all persons who study economy, and of sanitarians.

The Dynevor Coal Co., of Neath Abbey, exhibit another fuel of this description, which is specially recommended for domestic consumption; but these blocks are perforated—hence, directly they are placed on the fire, the flame and smoke will pass through the holes, and the fuel will burn very brightly. It is made from the well-known 'Duffryn Main Colliery' coal, and the pure nature of the coal causes the fuel to burn, leaving only a slight red ash.

The Wear Steam Fuel, made at the Wear Fuel Works, Sunderland, has been well tried and used by many lines of steamers, especially those trading at that port; and large quantities, we are told, are annually exported to Russia, Spain, and Italy. It is manufactured from the best north country steam dust coal, combined with a small percentage of pitch dissolved at a very high temperature, and afterwards compressed by powerful machinery in blocks of about 20 lbs. each. It is thus rendered very hard and impervious to moisture.

Messrs. Butler, Wilkes and Co., of 29 Coal Exchange, London, and the Dunraven Aberdare Colliery, Glyn Neath, South Wales, have specimens from their nine feet and other seams of their 'Smokeless' coal, which burns more freely than the anthracite, and is at the same time absolutely smokeless.

Messrs. Charrington, Sells, Dale, and Co., of Broad Street, Ratcliff, London, exhibit no less than twelve varieties, comprising anthracite from three or four noted collieries. Best Welsh and hard steam, Best Wallsend, Silkstone, Derbyshire, bright and best gas and oven coke, for domestic and foundry use.

The following collieries and companies are also represented:—Aberdare Rhondda Steam Coal Company; the British Patent Coke Co., of King's Cross, N.; the Rhos Morgan Coal Co., Swansea Anthracite Coal; the Cambryn Colliery Co., Limited; Swansea Anthracite and Smokeless House Coal; the Cawdor Colliery Co., Swansea Anthracite Coal; the Cwmaman Coal Co., 66, Mark Lane, E.C., and Cardiff, Swansea, etc.; 'Llest' and 'Cwmaman' Smokeless Steam Coals; the Dunraven Colliery, 9, Fenchurch Street, E.C., and Pontypridd, etc., Smokeless Steam Coal; the Dynant Colliery Co., Llanelly, Anthracite; the Dynevor Coal Company, 14, Gracechurch Street, E.C., and Neath, Patent Fuel and Semi-bituminous Coal, Graigola, Merthyr; Cory, Yeo, and Co., Swansea; Swansea Smokeless Coal and Patent Fuel;

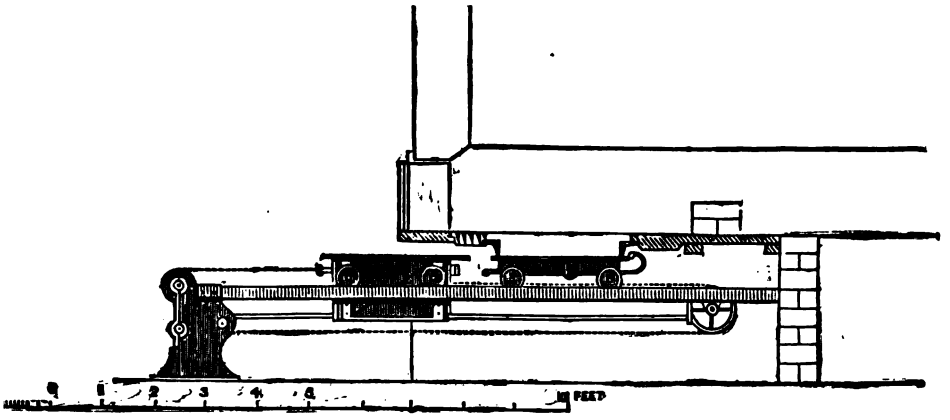
; Navigation Steam Coal Company, Limited, 81, urch Street, E.C., and South Wales; Locket's r Steam Coal Company, Limited, 18, Upper Street, E.C., and Cardiff, Smokeless Steam Coal; erkins, Swansea Anthracite; the Trimsaran Anthra- llieries, 46, Leadenhall Street, E.C., Anthracite Coke, and Patent Fuel; Williams and Company, hopsgate Street Within, E.C., various smokeless Coals, Bituminous Coal and 'Bessemer' washed and coke.

ACES, BOILERS, AND APPARATUS USED OR MANUFACTURING PURPOSES.

ugh it must be admitted that by far the largest of exhibits are devoted to domestic appliances for cooking, and ventilation, the display of apparatus ection is of no mean character. The most approved is extant for consuming smoke in furnaces, coupled chanical stokers, appliances that are yearly increasing r, and other means for economising fuel, are fairly ted, and a close observation will discover some le inventions tending to these ends, which we below.

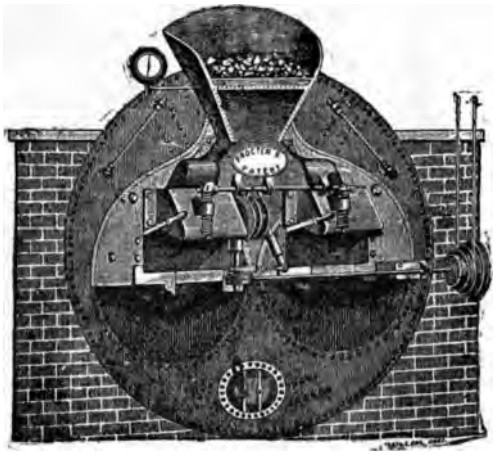
s. J. and J. M'Millan's (Port Dundas, Glasgow) ding Apparatus, for furnaces of public works, is in principle to their appliance for attaching to ranges, described and illustrated by us in that sec- id, like its prototype, it may be termed automatic i, as in raising the fuel to the bottom of the fire it l to enter it at one point only, and therefore can- other takes its place. By this arrangement, viz., placing the fresh fuel on the bottom of the furnace, and its being surrounded by an incandescent mass, the gases from the new fuel become separated and ignited, and smoke is consequently not allowed to form. As, by these means, no cold air can be admitted to the furnace except through the grate bars, when it becomes heated, a less amount of fuel is required to create the same heat, the caloric in the coal is better secured, and it is at once made heat-producing. There are several other little advantages, that will occur to the practical mind, in the use of this apparatus, and to those of our readers connected with public works, where economy in every department has to be studied, as well as to the great mass of the manufacturers of this country using furnaces, this invention is well worthy of consideration.

Amongst the appliances in connection with furnaces and boilers are several examples of mechanical stokers. That of Mr. Jas. Proctor, Burnley, Lancashire, claims especial attention—first, because it is no theoretical invention, having been before the public for more than five years; and secondly, that the testimonials in its favour from some of the largest users of steam power in the kingdom are of the most gratifying character. Assuming, from the opinion of those best enabled to judge, that mechanical stoking has many advantages over hand stoking, owing to the number of appliances invented for the purpose, it may be as well to enquire into the especial features of the 'Proctor' stoker, as distinguished from others. We append a drawing of it. It will be observed that it is applied without in the least interfering with the boiler, being fixed simply by few hours. The object of a mechanical stoker is to place



isplaced. We append an illustration, the upper which shows the furnace, and the under portion a ls on which the fuel box and a platform on wheels by means of an endless chain. The action is as —The fuel box having a movable bottom being by hand or mechanical means arranged for the pressed forward under the fire bars, and, as it he platform before mentioned, shown to the right ketch, the two become locked. As the latter wards, the fuel box gradually takes its place, until ght directly under the opening through which the rced into the fire. This is now raised by means of rough the opening in the fire-bars into the mass id the box is withdrawn, bringing with it the plat- ore named, until it reaches its proper position, e two are automatically unlocked and the box o the front, and is ready for a fresh supply, and its next requirement. No fuel can possibly fall opening during the process of feeding, as when plate or platform recedes the new fuel gradually place, and when that is raised to the fire, the mov- om of the feeder, which is also a flat plate, has place. Again, as this is withdrawn, being on an el with the other, as the one is drawn away the the coal evenly over the fire, and in such quantities only as shall enable the air to consume it, and these qualities are admirably effected by Mr. Proctor's invention, which recent improvements have considerably enhanced. It consists of a lantern wheel, spring, and shovel. The tension of which spring can be varied at pleasure to throw the coal farther from or nearer to the front of the fires; and, by placing the bowls of the lantern wheel at variable distances from the centre, it covers the fires uniformly from back to front. Another novelty in this invention consists in the arrangement of the ram and ram box, which entirely dispenses with the rollers for crushing, and gearing belonging to same; and also dispensing with the division in the ram box, using an open one, enabling a larger piece of coal to be conveyed to the shovel box—which also is an open one—this being effected by using a peculiar shaped ram, which pushes the coal alternately to each fire, and which is made to work upon the bottom of the box, and cannot possibly fasten when using wet coal. The wheel having three different lifts or throws, varies the tension upon the spring; the largest lift, giving the most tension, throws the coal to the back, the next to the middle, and the least to the front of the fire, thereby ensuring an uniform covering and regular supply of the bolts of the ordinary front, and can be applied in a

coal to the fire. It is here that the special features in this stoker present themselves (viz.) in its originality, adaptability, and positiveness of its action; for after the shovel



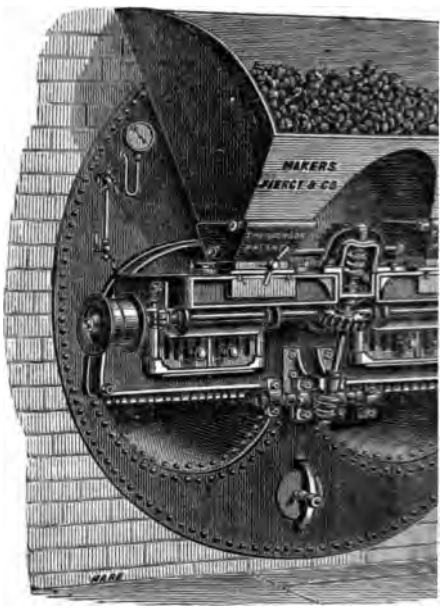
has received its charge of coal, it will throw it where it is desired, with greater accuracy than can be done by hand, and it will be seen by a conformation of wheel and shovel, it can be adapted to any kind of furnace, the wheel being

made larger and the shovel broader, as the furnace increases in length and breadth. The speed of the stoker, as well as the supply of coal, can be regulated according to the work to be done, and as a proof of the little power required to drive it, a ⅝-inch band will drive three with all necessary gearing attached; the wear and tear is small, and the saving of fuel is said to amount to fully 7½ per cent., while the working capacity of the boilers is increased (according to reliable testimony) some 20 per cent. Above all these advantages we obtain what we are so desirous to accomplish, viz., entire consumption of smoke.

Henderson's Patent Fire-door Company, 40, Castle Street, Liverpool, exhibit the specialty from which the Com-

pany derive their name. This furnace-front and fire-door is specially adapted for steam- ships, as by its use the temperature of the stoke-hole is reduced and its improved; at the same time much better cor obtained. In the 'Furnace-front', is constructed into which the air is admitted through small pe by this means it enters the furnace in separate cc more readily mixes with the gases given off b At the present time the firm are engaged makin these for the furnaces of a large ocean steamer i construction, and are also fitting them on a bc Exhibition. They may be seen at work in Messrs. Goodman Brothers, Alscot Road, Bern Messrs. Clay, Son, and Taylor, printers, Bread S where they have been in successful operation for past.

Henderson's Patent Mechanical Stoker and I Cleaning Furnace, manufactured and exhibited Percy and Co., Broad Street Works, Birm



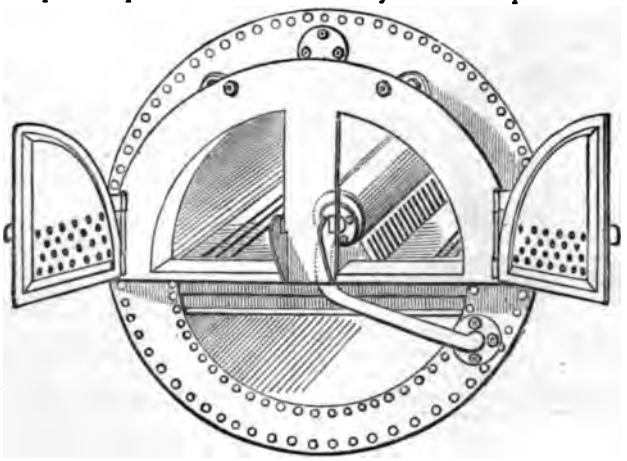
already very well known; many hundreds bei The furnace is fed by means of a hopper with which is suitable machinery for throwin fuel, the quantity of which is regulated by simp a few turns to an adjusting screw. The actic grate-bars is such that the clinker is carried autc to the back, there remaining till cool, when it is without opening the furnace doors. The best and mechanism is liable to accident. Should any den occur to this appliance provision is made for throwing it out of gear, and maintaining the sa matic movements by hand lever, whilst coals thrown on through the ordinary doors, which in t like most mechanical stokers, are retained.

Messrs. Martin and Co. also exhibit their we smoke-preventing doors and furnace grates. I necessary to go into a detailed description of t pliances, as they have been long before the public largely adopted by the Admiralty. The doors ar able to any kind of furnace, either land or marine, made to open either inwards or outwards at any an being balanced, are much handier than any other door. Air is admitted in such a manner that it mi the gases in process of combustion, and arrests the ment of smoke. Steam is more easily maintai economy effected. Government trials on board *Grinder* at half boiler power showed a saving of 1 cent. in favour of Martin's system.

The principle adopted by the Wavish Fuel Ec Co. for the prevention of smoke in all kinds of boi

que, and we should imagine very effective. ying sketch represents it in connection with ornish boiler, a glance at which will show e absence of bottom bars, but a sufficient armed air to produce perfect combustion

small front damper which allows air to enter the air chamber formed in the brickwork, and throw several tongues of air upon the fire, is when the fire is very black, to circulate the smoke, and by this means to greatly facilitate the efficacy of the other part.



the fire by means of double bars running th, and placed upright in the centre of the ally dividing it into two parts; the aper- bars are vertical, thereby producing two currents which pass up the sides and unite he furnace. Above these bars is a tube con- back with the upper part of the boiler, and rith the lower part, a thorough circulation ult, and by the time steam is generated the ottom of the boiler is more than 200°, con- temperature of the boiler-plates is even hich is a great point in its favour.

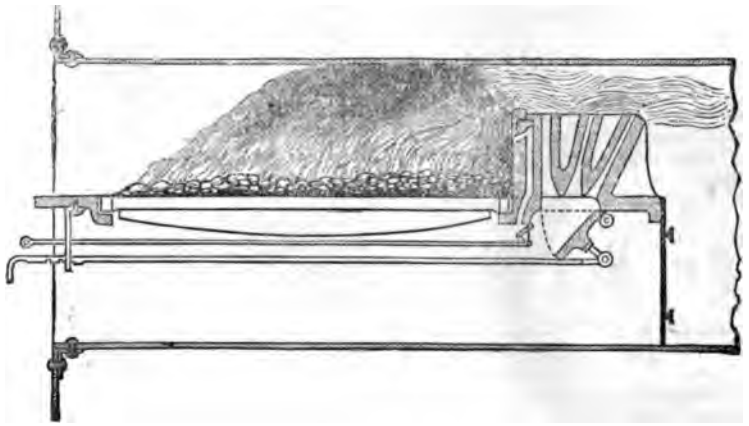
t important among the smoke-consuming and paratus specially adaptable for hand-fired ncashire boilers is that patented by Messrs. o., of 28, New Bridge Street, Blackfriars, paratus in question forms the bridge to the so constructed as to admit three or four to meet the carbon and other unconsumed fuel just as they are passing on to the flue, his arrangement finally to discharge them- ves in dense black volumes from the chimney ily, however, by means of this invention the nly arrested but consumed, for the air in its

The Patent Steam Boiler Co., 28, Heneage Street, Birmingham, show the Patent Root Boiler, which it is not necessary for us to comment upon, as it has now been in successful operation for some years. This firm also show a mechanical stoker applicable for the above or any other furnace; the construction of it is simple, and the working parts few and strong, thus rendering it almost exempt from casualities.

Mr. J. Tenwick of Grantham exhibits specimens of his patent Coal-saving Fire-bars, which are suitable for boiler and other furnaces, baker's ovens, etc, and can be fixed in lieu of existing ones without any alteration, which is an advantage not to be lost sight of. They are of an angular section, the top portion being provided with a number of diagonal slots, so that an uniform admission of air is obtained, thus facilitating the complete combustion of the fuel.

Another important appliance made by the above manufacturer is a patent Feather-balance Smoke-preventing Furnace Door and Front. The door can be opened either at the top or bottom, thus giving the stoker perfect control over the furnace, to prevent smoke.

Mr. Jas. Moore of 18, Railway Street, Bromley-by-Bow, E., has a model demonstrative of his patented improve-



bridge flows under the fire bars, which being ion cause it to attain to such an intense heat diately mingles with and ignites the uncon- ts, resulting in perfect combustion. A glance tion will show two dampers which are regu- by the stoker. The principal object of the

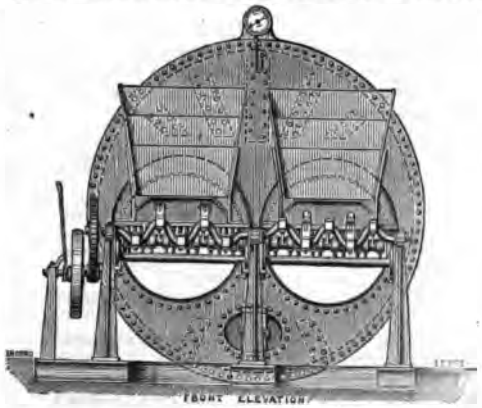
ments for the economisation of fuel and the prevention and consumption of smoke in internally fired Cornish boilers. The most important feature in this invention is the fire-brick diaphragms, the number of which is determined in accordance with the length of each particular boiler. A steam tank is fitted in the second of these par-

titions, which is entirely independent of the boiler, and, in about fifteen minutes after the lighting of the fire is fairly in action, thus preventing the formation or escape of smoke. This patent is applicable to various kinds of furnaces, and may be seen in operation at the above address.

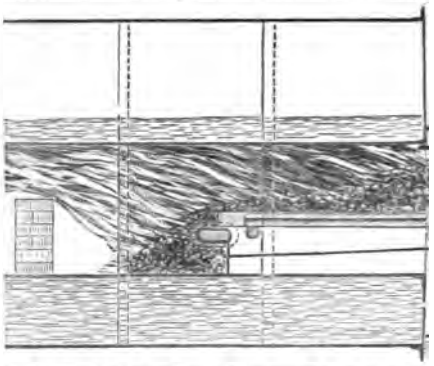
Geo. Waller and Co., of Holland Street, Southwark, S.E., shew Smith's Patent Mechanical Stoker. In this, as in most of its kind, the fuel is supplied to the furnace by a hopper, the quantity being regulated by suitable machinery which, at the same time, imparts an up-and-down, and a backward-and-forward motion to part of the bars in this case, the alternate ones being stationary. The result of the combined movements being to break up the body of fuel, rendering clinkering unnecessary, and also preventing smoke. A special feature in this appliance is in the bars being made hollow, a small jet of steam travels along them, keeping them cool, and made to pass out at the side as to increase the draught, and improve the combustion.

The Great Britain Smoke-Consuming and Fuel-Saving Company, St. Stephen's Chambers, Telegraph Street, Bank, E.C., exhibit an appliance radically different from anything else of the kind. It consists of two globes, which are fixed on either side of the furnace-door; in each of these a steam-jet is fixed, and communicating with them is a pipe from the boiler. Below the globes are cylinders about 16 in. long, and 2 in. in diameter, open at the bottom. Directly steam is admitted into the globes the air therein is at once exhausted, and consequently fresh air rushes up the cylinders to supply its place, by means of which oxy-hydrogen gas is found, and the products of combustion thoroughly consumed. It only remains to be said that the above apparatus can be fitted in a few hours at a trifling cost.

Mr. G. Sinclair of the Albion Boiler Works, Leith, exhibits his Patent Mechanical Self-Acting Stoker and Smoke-Consuming Appliance, which is adaptable for all kinds of internal and externally-fixed boilers, brewers, coppers, etc., and worth the consideration of all steam-users. One of the principal advantages of this invention is, that it is practically smoke-preventing. This end is attained by means of a Hopper attached to the front of the boiler and in front of each



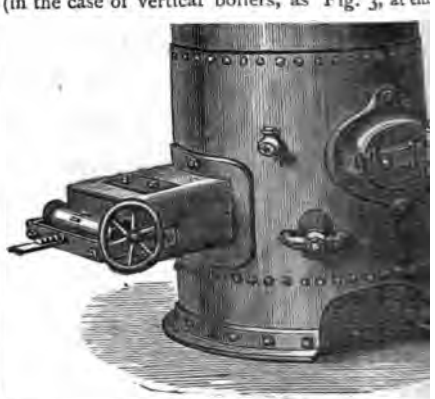
furnace, thus keeping out all undue admission of cold air, and virtually coking the coals before coming in contact with the fire, the result being that the gases are consumed and burnt, and no smoke being formed, there is absolutely no waste. The result is a considerable saving of fuel, and the maintenance of a steady steam pressure. The stoking arrangement is ingenious, yet at once simple and efficient. As will be seen by the drawing, a cranked shaft is fitted in front of each furnace, which by connecting rods works the fire-bars backwards and forwards, imparting at the same time to them a slight up and down motion, the result of the combined movements being to thoroughly break up the clinkers and deposit them in the ash-pit, and to admit a constant yet only sufficient stream of cool air up through the fire, thereby rendering it always clean. Fresh fuel is supplied by means of a pushing plate in the bot copper, which is also propelled by connecting rc one shaft. An important feature of this pat



should not be lost sight of, is a cooling pipe at the furnaces wherein water is circulated from t counteract the heat produced from the collectin clinker.

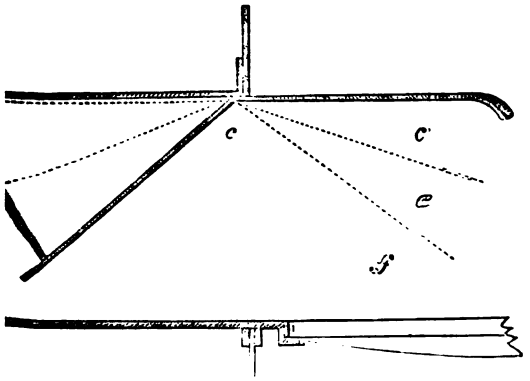
Messrs. Knowles and Halstead, Globe Works ham, Bradford, show the 'Helix' Furnace F means of which fuel is admitted up through th burning all the products of combustion and the formation of smoke. This is effected as f Instead of the furnace floor consisting entirely of some are omitted, and in their place long troughs tapering from front to back; in each of these screw is introduced, which, by suitable machinery the fuel from a hopper fitted in front of the boiler, it upwards and forwards in regular quantities furnace. A backward and forward motion is parted to the fire-bars which carries the fuel on to diary grate at the end of furnace; this can be t when the fireman wishes to remove the clinker, reducing the pressure of steam.

Mr. Engert's (Three Mills Lane, Bromley- recently patented invention for the prevention o and the better consumption of fuel, is well worthy not only for domestic fire-places, but for all steam boilers and furnaces, both stationary, lo and marine. The principle of it consists in supp fuel, which in the case of boilers may be the c slack, to the fire in such a manner as to prevent from condensing and cold air from rushing in t boiler. This is effected as follows: an iron box i (in the case of vertical boilers, as Fig. 3, at eith



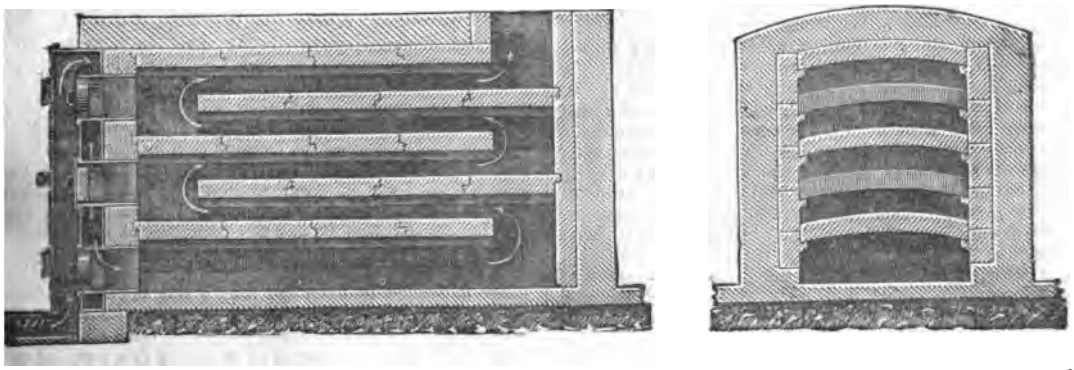
about the ordinary level of the fire, the coals b from the top of same, and by means of a lever plate being, as it were, pushed into it, but not un become thoroughly *coked*, thereby utilising a giving parts of the fuel, and forming little or For furnaces, the application differs in the 'box

the front of the fire bars in lieu of the ordinary doors; l within it, instead of the movable plate, an angular tter is introduced, resting on pins, and attached to a chet in front to regulate its movements. In the diagram,



is the shutter, which, when the fire requires feeding, is ought to the points D, the front part coming close to top f box, and the corresponding part at back resting on the e; the fresh coals are then thrown on, the front doors e shut, and after a few minutes the shutter is lifted from e fire, and but little smoke is visible. It will be seen at by this simple apparatus the cooling of the boiler is ided, and the gaseous parts of the coal fully consumed. r domestic grates and kitcheners the 'box' is fixed at back, and worked by a simple arrangement projecting m under bottom bar of grate, or in the case of kitcheners a lever at the back of the hot plate. Any kind of coal y be used with this apparatus.

M. Michel Perret, of Paris, represented by Messrs. B. Remmers and Co., Glasgow, his sole agents for the ited Kingdom, exhibits two apparatus of undoubted rit in this department. One of these, named the 'Grille mergée', from the lower portion of the bars being mersed in water, consists of a square wrought iron tank, th an inch or two of water at the bottom, in which gitudinal plates of iron connected with the bars rest. e latter are composed of round iron about 1¼ inch meter, to each of which is attached a cast-iron te of iron about ⅞ inch thick and about 15 inches p, which rest in the water at the bottom, and each



te has two longitudinal slits in it about 9 inches long the better circulation of steam and hot air. The portion of the bars are placed so close together that hough there is a small interstice between each, it is so nute that no fuel can pass through them. The furnace built up in the ordinary way above the apparatus. Fuel the commonest kinds can be burnt in it, and the action the water, which quickly becomes heated on the iron, by erating steam, prevents the bars from becoming over- ted, and consequently from burning away, and, what is greater importance in connection with all furnace bars, arrests the deposit of clinkers upon them. In other words, it may be said that the heat communicated from the fire bars to the water, throws a small portion into steam, which passing through the fire, splits it up or separates it into its constituent gases, burns the hydrogen, and promotes combustion generally, the main feature obtained being not only economy in fuel, but perhaps a still greater saving in fire bars and general attendance No less meritorious in its arrangements is M. Perret's patent Multiple Stage Furnace for disseminating hot-air by means of pipes throughout a building or for malt kilns, and the numerous drying processes required in different manufacturing businesses. The furnace, built of brick work, is enclosed in front by a cast-iron door, having four small ones in its elevation with ventilators for admitting air, and an outer one with similar arrangements. The interior is composed of four fire-clay stages or shelves, slightly arched, and an ash-pan; and the idea sought to be taken advantage of, viz., that fire-clay has an immense regenerative power of first absorbing heat, and then giving it off slowly. At first, lighting it is effected at the bottom until the first stage becomes red-hot; a small quantity of fuel is then spread over it, and in due time the second is similarly heated, and so on to the top, when the whole will be formed into incandescent mass. Now the process is reversed, the furnace being fed from the top stage. Step by step, as required, the burning mass of fuel is gradually raked downwards to each successive stage; and to give an idea of the length of time it lasts, under ordinary circumstances, 72 hours elapse before the top layer of fuel reaches the bottom stage, from whence it falls to the ash-pit, and is taken out looking very much like sand; in fact, it has been used for mixing with mortar in the Exhibition in building up some of the brick-work. The fuel employed is mere refuse, such as has comparatively no commercial value, and what is being used at the Exhibition has cost only one shilling per ton, and is the veriest rubbish with any pretensions to coal dust that we ever saw. But there are thousands of tons of this rubbish to be obtained almost for the carting from every coal mine and gaswork, which in apparatus of this character can be utilised to the greatest advantage. One and a half cwt. of this fuel will last for 24 hours, and its use should inaugurate a new era in heating apparatus in this country.

Messrs. Ireland and Lownds, Engineers, West Street, Leek, Staffordshire, exhibit a Patent Metallic Tubular Bridge for the prevention of smoke in steam boiler and other furnaces, the principal advantages of which are that it is perfectly self-acting, and can be accommodated to any strength of draught, while the air for the consumption of the free carbon is heated to such a degree, as to effectually secure the consumption of about 90 per cent. of the smoke.

The Patent Improved Self-Stoking Smokeless Furnaces of Messrs. T. and T. Vicars, of the Wheat Sheaf Foundry, Seel Street, Liverpool, are well known, something like 1600 of them being in use. In common with self-stoking furnaces generally, the fuel is supplied to the fire by means of a large hopper, from which it is delivered in any desired quantity on to a plate immediately in front of the

bars, where it becomes coked before passing on to them, which, however, it eventually does, and by their motion is carried to a grated plate at the back, where the combustion being completed, it falls into the flue, from whence the clinkers can be removed as often as desirable without the necessity of opening doors and admitting volumes of cold air inseparable from hand-firing. We understand the firm have been engaged upon these appliances for the past sixteen years, during which time they have introduced various improvements, the present excellent exhibit being the result of these prolonged experiments.

Another admirable smoke preventer and mechanical stoker is that known as McDougall's Patent, manufactured and exhibited by the Chadderton Ironwork Company, Limited, of Chadderton, near Manchester. As is the case with the other mechanical stokers we have referred to, the fuel is put on by means of a hopper, fixed, in this instance, at a more convenient height than some we have noticed in front of a furnace. Upon the bottom of this a ram works to and fro, the face of which is fluted and case-hardened, serving the double purpose of crushing any lumps too large to pass the aperture, and regulating the supply into the furnace. The fire-bars are actuated by an eccentricated shaft, the eccentrics being of different centres and arranged alternately. By this means the fuel is carried forward, and by the time it reaches the bridge has assumed the form of clinker, and so is finally pushed over into the flue. Wherever these have been fixed, universal testimony is given to their smoke-consuming powers and saving of fuel. Amongst other places, we may mention that sixteen of them are in use at the well-known paper mills of Mr. E. Lloyd, who speaks of them in the highest terms.

Blocksage's Patent Smoke Burner and Fuel Economiser, shown by Mr. John Collings, Wallshaw House, Oldham, is an apparatus, without the use of machinery, for the prevention of smoke in all kinds of furnaces. It consists of an inclined oven placed in front of the boiler, and fired by hand in the usual way. The top and sides of this oven are lined with fire-clay blocks, which, becoming intensely hot, burn the smoke naturally impinged against them from the sloping nature of the bars, and perfect combustion is thereby attained.

A smoke-consuming furnace worthy of notice is that exhibited by Mr. C. B. Gregory of Beverly, New Jersey, U.S.A. The one shown is in a portable form, mounted upon wheels to facilitate removal; it is about 3 feet square, and stands 4 feet from the ground, but is adaptable for all practical purposes industrial and domestic. In the front of the furnace may be seen several doors for the purpose of regulating the supply of air, or for otherwise getting access to the fire-box, which is situated near the centre; immediately above this, and inclining to the back of the furnace, is the combustion chamber, while in the front and at the top is a hopper; in this the fuel, which may be any kind of coal or even refuse matter, is placed. By this means the gases are drawn through the fire, and, for the most part, consumed; but before entering the flue they are met by strong currents of air, heated by having passed around the fire-box, thus destroying any carbon remaining unburnt. That this may be patent to all, the flue-pipe where it leaves the furnace is enlarged to 12 ins. diameter and 2 ft. high, fitted with talc windows; and the other end, instead of disappearing through an aperture in the ceiling, terminates a few inches below it, and the absence of any deposit thereon speaks well for its efficiency.

A description of the remaining exhibits and such tests as may be completed at that time will appear in our next issue.

(*To be continued.*)

The Local Board of Ashford, Kent, after much discussion and several visits to other sewerage works, have decided, subject to the sanction of the Local Government Board, to adopt, for the disposal of the town sewage, precipitation by means of sulphate of alumina and lime, and filtration by passing the effluent through land.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A meeting of this Society was held on Friday, November 18th, Dr. J. W. Tripe, President, in the chair. A report from the Council was brought up, recommending that the published *Transactions* of the Society should contain a fuller account of the discussions which take place before 8 p.m., as well as of the discussions on the papers which are read subsequently.

The following gentlemen were elected members of the Society:—Mr. H. J. F. Groves, Medical Officer of Health for Lambeth, as a Metropolitan Member; Mr. G. H. Fosbroke, Medical Officer of Health for Stratford-on-Avon; Dr. A. Downes, Medical Officer of Health for Chelmsford and Maldon; Dr. Simpson, Medical Officer of Health for Aberdeen; and Dr. Hime, Medical Officer of Health for Sheffield, as extra-Metropolitan Members.

A letter was read from the Société Française d'Hygiene, of Paris, with a diploma, conferring the honorary membership of the Société on the Society of Medical Officers of Health.

A letter was read from a correspondent asking how near to a small-pox hospital, in the opinion of the Society, it would be safe for a dwelling-house to be built, and stating that the writer had objected to a house being built within a hundred yards of a hospital for infectious diseases in the town in which he was Medical Officer of Health. On the suggestion of Dr. Dudfield, it was decided to inquire of the writer whether any local bye-laws or regulations existed, which could limit the proximity of a dwelling-house to such a hospital.

REPORTS ON INFECTIOUS DISEASES.—Mr. JACOB called attention to the valuable reports on infectious diseases which were, from time to time, made by the medical inspectors of the Local Government Board to that Board, and expressed his regret that outside the officers of the Board these reports were barely heard of. He thought the subject was one deserving the attention of the Society, and moved that the Council should be requested to advise what steps should be taken with a view to placing copies of these reports within reach of Medical Officers of Health. The proposal was seconded by Dr. Dudfield and agreed to.

VENTILATING SHAFT FOR SEWERS.—Dr. CORNER introduced to the Society Mr. Robert Parker, Surveyor to the Board of Works for the Poplar district, who exhibited a model of ventilating shaft for sewers. Mr. Parker, after referring to the evidence which existed that either the air of sewers or particles carried by such air was injurious to health, pointed out that the only means by which such air could be kept from becoming offensive was by diluting it, keeping it in motion, and ejecting it from the sewer. A short account was given of the ordinary methods of sewer ventilation, and the speaker claimed for his own method that it was more perfect, and that for its adoption it was not necessary to make many alterations in existing sewers; the principle can be applied to all, no matter how defective their construction may be. What is wanted to keep our drains and sewers free from gas is a force to drive out whatever gases may be within the sewers and keep up a constant current of fresh air through them. Mr. Parker proposed to utilise for this purpose the force of the wind, which is a constant force, with an average velocity in England of from six to eight miles an hour. It would be necessary to have a number of cast iron shafts erected, twelve feet high and ten inches in diameter, in convenient and open places, and also pipes of various sizes, according to circumstances, from the sewers and existing drains at the rear of houses to the house-top, as high as the chimney stack, and these pipes or ventilating shafts should be surrounded by a cowl, guided by a vane attached to it, so that its opening or aperture should always be facing the wind; the air or wind impinging on it will force down

ıd pass into the sewer, and travel along
ins and ramifications to find an outlet,
cape. A number of experiments have
nder Mr. Parker's superintendence to
he wind and air could be conducted into
was found there was always a downward
lating shaft, and an upward rush of pure
's and drains in its immediate neighbour-
r then exhibited a model of his cowl,
ılt of various experiments showing the
ı a sewer thus treated at varying diffe-
ure in and outside the sewer, and with
wind.
ed whether this method was serviceable
ere was still, and was informed that it
t acted with a velocity of air of even less
hour, and that, as a matter of fact, the
er still.
ames Stevenson, Mr. Parker stated that
'is would be placed at the backs of houses.
there was no doubt that Mr. Parker was
that the only method of keeping the air
ıs to constantly change it, but that if this
adopted it would be necessary to place
ratus at the lower levels, so as to permit
at the upper level of the sewer. He
e which had many years ago been placed
f a sewer with a view to burning air which
ıme from a sewer at this point, whereas, as
e air entered the sewer at this point, and
Ie objected to Mr. Rogers Field's system
ıe house-drain from the sewer, except in
sewer was badly constructed. In his
f sewers was much more harmless than
l urged the necessity of drain ventilation.
thought there was much evidence that
harmless, as people working in sewers
:ct until they become acclimatised.
ı thought that the best method of sewer
at which took advantage of the natural
air from the low to the higher level. If
re ventilated, and no sewer were allowed
no other apparatus would be required.
arcoal trays placed over openings at the
:wer with a view to preventing offensive
ly acted as impediments to the entrance

ıgreed generally with Dr. Carpenter, and
ion that with regard to house drainage an
and at the high level presented a perfect
on.
Dixon, Mr. Parker stated that the appa-
ı a long time in good working order.
:R.—Mr. SHIRLEY MURPHY exhibited
g the behaviour of enteric fever during
present and ten preceding years; the
, barometric pressure, and the rainfall
eeks were also shown.
moving that the diagram be published,
ıt during the first three quarters of the
ıumber of deaths from this disease was
verage, and that it was only in the fourth
vere so much more numerous than usual.
distribution of cases admitted into the
Iospital.
ı IN MARYLEBONE.—After a few words
an, at the invitation of the President,
VTH gave some account of the outbreak
had recently occurred in Marylebone.
urred in August. There had been one
t's Buildings in 1878, but since then
resent outbreak. It began in a colony
ended down one side of a street; all
this street might be regarded as one
to the manner in which they communi-
other. He thought small-pox and
ing to the inability of the legislature to
rson. It is first necessary to remove the sick person to the hospital and then to disinfect his room; for this purpose his family must be turned out, often into the street. The bodies of these people should be disinfected, but this, of course, could not be done. Mr. Blyth thought more power was needed to deal with infected clothing and infected persons, and suggested that it would be well if, when typhus existed in an area, powers could be received from a magistrate for burning old clothes, providing new ones, and washing the bodies of those who dwelt in the infected area. He also spoke of the great difficulty there was for those who had not seen typhus to recognise the disease under all circumstances.

Dr. BUCHANAN suggested it would be interesting to the Society if Mr. Lovett would give his experience of existing laws in dealing with outbreaks of typhus.

Mr. LOVETT stated that each outbreak with which he had had to do had begun in a condemned area, but that as soon as the sick were removed to hospital, and the houses closed under a magistrate's order, the extension of the disease was checked. He thought Torrens' Act, as it now stood, could not be of much help to health officers.

Dr. BUCHANAN raised the question whether the present prevalence of enteric fever might in any part be due to cases of typhus which had not been recognised.

Dr. DUDFIELD was of opinion that the existing laws would be found to be of much avail in limiting an outbreak of typhus, and that health officers would not be dealt with very critically if they went beyond their legal powers at the time of a great emergency.

ENTERIC FEVER AND CONTAMINATED WATER-SUPPLY.—Dr. CARPENTER discussed the prevalence of enteric fever in association with contaminated water-supply.

Mr. SHIRLEY MURPHY said that so far as the St. Pancras cases were concerned they were certainly enteric, and did not appear to be due either to contaminated milk or water-supply, but they occurred at distinct intervals between successive cases, corresponding with incubation periods, and that he had noted the frequency with which one case was followed by others in the same house, though whether more so than usual his experience did not warrant him in saying.

Dr. CARPENTER, in reply to Dr. Dudfield, made a few remarks on the Royal Commission appointed to consider metropolitan hospital provision for infectious diseases.

MILK-CONTAMINATION.

The following memorial has been presented to the President of the Local Government Board by the North Western Association of Medical Officers of Health:—

'To the Right Honourable J. G. Dodson, M.P., President of the Local Government Board. The Memorial of the North Western Association of Medical Officers of Health respectfully sheweth:—That your memorialists are a body of Medical Officers of Health, practising in the counties of Lancaster, Chester, Derby, and the West Riding of the County of York. That your memorialists having evidence that certain epidemic diseases, as scarlatina and typhoid fever, are not infrequently spread by means of milk, and holding that certain epizootic diseases, as foot-and-mouth-disease, may also be occasionally spread by means of milk, and believing that the powers Local Authorities already possess are inadequate to prevent the specific contamination of milk, or its sale when contaminated, would urge upon your Honourable Board the desirability of taking steps to provide Local Authorities with additional powers; that is to say:—1. To enable Local Authorities to require all licensed milk-sellers to notify all cases of infectious disease appearing on their premises, with ability to close their premises till the removal of the infected animals or persons, and the disinfection of the premises. 2. To enable Local Authorities to veto the sale of milk by vendors coming from without such Authorities' boundaries. Your memorialists would also urge upon your Honourable Board that Local Authorities should be notified by memoranda or otherwise, to put in force the powers they at present possess for the efficient inspection of milk, enjoining in particular:—1. That proper inspectors be appointed; 2. That the fix-

tures of premises proposed to be used for dairy purposes be referred to the Local Health Officer to determine; 3. That the storing or selling of milk in general shops be prohibited; and 4. That samples of milk be taken for analysis from time to time from all licensed vendors in a district, and not merely from those against whom specific complaints have been made. Your memorialists therefore earnestly pray that these propositions of your memorialists may have your careful attention. And your memorialists will ever pray, etc.

(Signed on behalf of the North Western Association of Medical Officers of Health.)

G. A. KENYON, *President.*
FRANCIS VACHER, *Hon. Sec.*

24th Nov. 1881.

VENTILATION AND SEWAGE.

Lieut.-Col. Thorneycroft, who has always been one of the foremost advocates for sanitary reform in Wolverhampton, recently delivered a lecture at the Free Library of that town upon 'Ventilation and Sewage.' In the course of his remarks, he drew attention to the new law with reference to the propagation of infectious disease lately promulgated in Wisconsin, and also to the New York plumbing inspection law, both of which have been published in the columns of the SANITARY RECORD. Colonel Thorneycroft proceeded to call attention to the new Sanitary Protection Society which had been formed in Wolverhampton. Finding that the voluntary association crept on so very slowly, he was interesting himself to get a system of compulsory investigation of all houses and places where people congregated, so that neither poor nor rich would be allowed to remain in a dangerous state any longer. As regarded sewage, the best plan, in his opinion, was that which sent the water away, and left the solid matter behind, available for the land. The lecturer concluded by saying that the best way for testing sewers was by forcing sulphur into the pipes. If there was then any leakage it would soon be found out.

TESTING TRAPS.

Some recent experiments made at Penton Place, Kennington, by Mr. Pullen and Mr. Davies, fully justify the condemnation of the ℧ trap as a filth accumulator, quite unfit to be used under any water-closet apparatus. When ink or paper was placed in the trap, it was clearly demonstrated that three or four full flushes of water were required before the water in the trap was left clean, and when it is remembered that in ordinary use one flush only is employed, it requires but little intelligence to understand that the ℧ trap must necessarily be, as we have previously described it, 'a filth accumulator'.

Some further experiments were made with ℧ traps, and although these were imperfectly carried out, and failed to convince many practical plumbers who witnessed them that a ℧ trap could not in any circumstances be safely placed under a valve closet, they showed the necessity for a thorough knowledge of the principles and practice of trap ventilation and sanitary plumbing.

It will be remembered that in the recent lectures given under the auspices of the National Health Society, Mr. Hellyer did not advocate the use of ℧ traps under valve closets. In all the diagrams in Mr. Hellyer's book the 'V dip' or 'anti-℧ trap' is shown in such positions.

The National Health Society have under consideration the establishment of a school for the practical teaching of sanitary plumbing.

The Guardians of the Battle Union have been requested by the Local Government Board to state their reasons for electing a gentleman as Medical Officer to whom the Central Board had already expressed an objection on the ground that he already held the appointment of Sanitary Inspector of the Union. The reply of the Battle Guardians was that the Medical Officer was elected by a majority of the Board, and they regretted that they could not give further reasons.

LAW REPORTS.

GASTRIC OR TYPHOID.

In a case recently heard at the Edinburgh Police Court, a medical practitioner was prosecuted for not having given information under the Local Act of 1879, of a case of infectious disease under his care. He contended that it was a case of 'gastric' fever, and as such, not coming under the operation of the Act. The Medical Officer of Health held that it was a case of typhoid, and that the terms 'gastric' and 'typhoid' fever were synonymous. This was the view accepted by the Sheriff, and a fine of ten shillings was inflicted on the defendant, who gave notice of appeal.

PROSECUTION FOR THE EXPOSURE OF INFECTED PERSONS.

A case has recently been brought before the petty sessions of Rochford, in which the Sanitary Authority of Southend prosecuted a visitor who, having a child ill of scarlet fever in the place, determined, notwithstanding the precautions of the Medical Officer of Health, to remove it to London; and did so, exposing it while in an infected state, first at the railway station, and afterwards in the train during the journey. The Tilbury and Southend Railway Company also prosecuted for the exposure of the case in the railway train, no information having been given to the Railway Company, so that they were unable to disinfect the carriage used. Both cases were proved, and fines and costs were made on the defendant amounting to £8 7s. 6d.

THE NOTIFICATION OF INFECTIOUS DISEASES.

Mr. F. W. Wright (Derby), has been summoned at the Derby Police Court, under the Derby Improvement Act of 1879, for neglecting to give notice of a case of typhoid fever at 28, Mansfield Road. The chief sanitary inspector (Mr. Clarke) stated that Mr. Wright had given the Sanitary Authority every assistance, but he appeared to consider that the proper time for notice to be given was after the patient had recovered. The Sanitary Committee, however, contended that the Act was passed for the purpose of getting the earliest possible information, and the Act stated that notice should be given as soon as the medical practitioner became aware of the nature of the disease.

Mr. Wright considered that the Sanitary Authority had no business in the room until the medical man had left it. On that ground he had never sent certificates to the Sanitary Authority until he had ceased visiting the patient. Disinfectants were used throughout, and never absent from the room. The magistrates said Mr. Wright had not complied with the requirements of the Act, and fined him ten shillings and costs.

At the same time, a man named Job Lean was summoned for neglecting to report to the Sanitary Authority the existence of scarlet fever on his premises. Defendant had removed from a house in which his child had been attacked with scarlet fever, and on the same day another family went into the house vacated, having no idea that the place was infected with fever. The child had been taken to a homœopathic chemist, who said that the child was feverish, but it had not been seen by a registered medical practitioner. The defendant in this case was fined five shillings and costs.

BRIEF NOTES OF USEFUL CASES.

RATING OF MARKET.

1881. *Bedford (D. of)* v. *Strand Union.* Covent Garden Market—Freeholder held rateable for certain Tolls arising out of the occupation of particular spaces of ground, although market tolls ordinarily are not rateable because incorporeal. (At Q. Sess.) (*Times*, March 19, 1881.)

CONTRIBUTION FROM OVERSEERS.—RATES.

1860. *City of London Union* v. *Acocks.* 22 & 23 Vict., c. 49, s. 6—A call on a parish in a Union for a contribution based on an estimate which includes a balance left over

preceding half-year is a valid call. (8 C.B. (N.S.) V.R., 608; 24 J.P., 502; Head-note in 8 C.B. L.)

RATING OF DRILL SHED.

C.O. of 18th Middlesex Rifles v. *Hendon Union.* eer Act, 1863," s. 26—Drill shed sometimes used Tennis, held rateable because so used—Cottage by sergeant in charge held exempt as necessary fe keeping of stores. (At Q.Sess.) (44 J.P., 698.)

LEGALISATION OF A NUISANCE.

Dewell v. *Saunders.* The erecting of a new ouse by the Freeholder of a Manor is not a common inquirable at the leet; but if the pigeons fly abroad mage of the King's subjects, the Judges of Assize cognisance of it. (Cro. Jac., 490.)

NON-PAYMENT OF RATES.

Jason v. *Dixon.* A collector of taxes may distrain arrears the goods of a third person found on the premises though only borrowed by the debtor, and though or has other goods of his own on the premises to satisfy the arrears. (1 M. & S., 601.)

LOCOMOTIVES ON ROADS.

Parkyns v. *Priest.* "Locomotive Acts," 1861), 1861 (ss. 3, 4, 7,) "Highways and Locomotive 78," ss. 28-9, 38—Tricycle propelled by steam l invisibly by means of a spirit-lamp, held within —Conviction affirmed. (50 L.J., Q.B.D., 648; Q.B.D., 313; 45 J.P., 452.)

APPEAL AGAINST RATES.

Reg. v. *Kent JJ.* "Union Assessment Act, 18—" Failure to obtain relief" before Assessment ee—Appeal to Sessions on part only of grounds fore the Committee—Appellant held entitled to (40 L.J., M.C., 76; L.R., 6 Q.B., 132.) [*Reg. idgeshire* dissented from.]

CORRESPONDENCE.

mmunications must bear the signature of the writer, not necessarily for publication.]

APPOINTMENT OF SANITARY INSPECTORS.

ublic officers have their associations. Protection o be the watchword of the times; then, why should Sanitary Inspectors of Great Britain have their The schoolmasters are, by agitation through an, becoming a strong body; and I do not think d be left behind.

efore ask you kindly to allow the columns of your paper (our organ) to be open for a discussion upon le of appointment and tenure of office of Sanitary rs'. I do not intend now to enter into a long it simply to ask you to kindly invite the opinion s upon the question, and to urge my brother o make known that you will receive and publish on the matter.

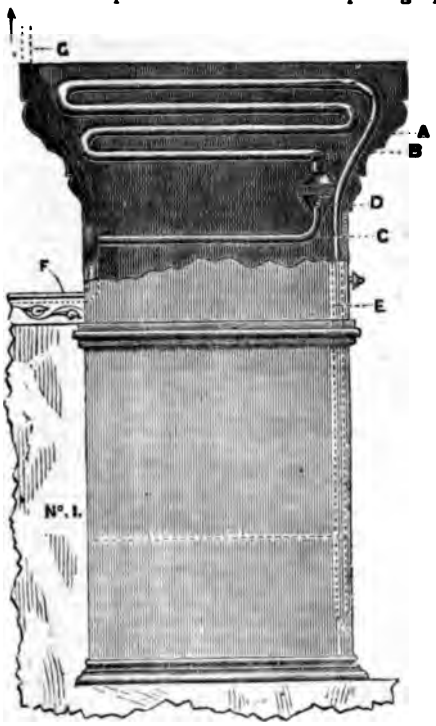
CUI BONO.

all be glad to receive communications and discon this subject.—ED.]

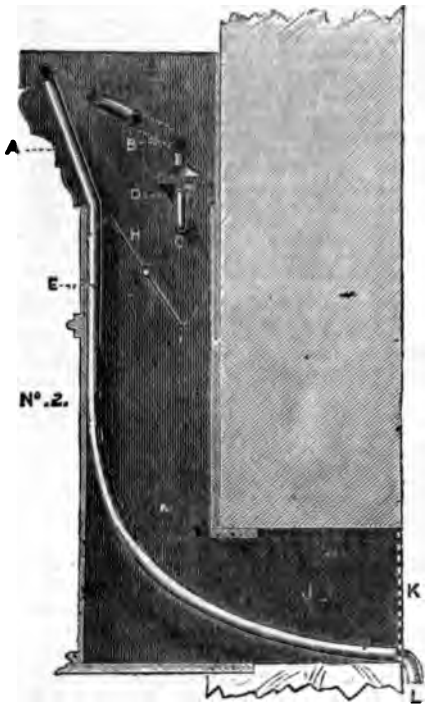
SANITARY INVENTIONS.

'S IMPROVED METHOD OF WARMING FRESH AIR.

s. Robert Boyle and Son, ventilating engineers, Holborn Viaduct, are the inventors of a simple enious arrangement for warming the supply of admitted into rooms and public buildings. It of a miniature coil of pipes placed in the upper a vertical tube, as shown in diagram. No. 1 A is the top of the tube, made of iron or zinc, to render it fireproof; B, the coil; C, an air burner; D, shield, perforated at the bottom to prevent the current of air passing up the



tube affecting the flame; E, pipe to carry off the products of combustion; F, ¾ gas pipe, led from most convenient source to supply air burner; G shows gas pipe brought



down from a bracket. *Diagram* No. 2.—H, regulating valve in tube; J, air hole cut through wall; K, cast-iron grating; L, mouth of pipe for carrying off products of

combustion. Dimensions of air tube, 20 in. by 9 in. by 4½ in. This plan has the advantage of being economical; and with the use of it, in conjunction with the air pump ventilator, Messrs. Boyle guarantee the satisfactory ventilation of any building, without the annoyance of the slightest disagreeable draught.

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will be subjected, if unnecessarily long, to a strict curtailment, however.

1. Is Dampness Legally a Nuisance Injurious to Health?

I am afraid that the gentlemen who wrote the editorial reply (No. 6) in your issue of November misunderstood my query. The case of *G. W. R. v. Bishop* is perfectly familiar to me, but it was certainly not the case I had in my mind. There is a fundamental difference between a dripping bridge and a damp house. M. O. H.

[Our Correspondent may think, and in some sense truly, that there is a 'fundamental difference' between a dripping bridge and a damp house, but if he tries, by the aid of the 'Public Health Act', to get a Court of Law to agree with him, he will very soon obtain judgment with costs against him. There are absolutely no decisions recorded which are available to help him in the matter, and the only way a Court of Law could be induced to condemn a damp house would be where there was involved a breach of contract between a landlord and a newly-arrived tenant as to the condition of a house just hired.]

6. Is a 'Dampness' legally a Nuisance Injurious to Health?

In relation to a query in last month's Sanitary Record under the above heading, I trust you will pardon me for expressing an opinion somewhat in opposition to that contained in your answer. In my opinion, Section 91, Par. 1, and Section 97 Public Health Act, 1875, seem fully to meet the case, as I think no Medical Officer of Health can hesitate to declare (on oath, if necessary) that such conditions as are described by M. O. H. are injurious to health. The case of G. W. R. *v.* Bishop hardly applies, as this (if my memory does not mislead me) was a case of water dripping from a bridge to the roadway below, which, though a nuisance in ordinary language, is not a nuisance as defined by the Public Health Act, 1875, inasmuch as it is not injurious to health, for persons passing under the bridge are only temporarily annoyed by the dripping water, and cannot be said to be injured in health, but when the rooms in which persons have to live and sleep are thus made damp the case is different, and there seems to me no difficulty in declaring that such a condition is injurious to health, and therefore a nuisance under Section 91, Par. 1, the house being 'in such a state as to be a nuisance or injurious to health'. A still greater degree of dampness would bring it, I think, under Section 97, as a house 'unfit for habitation'. I have, in several cases, acted on this opinion, but have not yet met with a case in which it has been contested before the magistrates.

Edgar G. Barnes, M.D.Lond.,
M. O. H. Eye Urban and Hartismere Rural Sanitary Districts.

3. The Ventilation of Rain-water Cisterns.

Will you kindly answer the following questions in your next issue? What are the best and cheapest means of ventilating rain-water cisterns for cottages? I find that in country places, rain-water often smells in the cisterns, whereas in the town it remains quite sweet, although in neither case ventilated. Does soot act as a preservative?

Cambria.

[If the rain-water be simply caught from the roof, and stored in tubs or butts, the cover to such a receptacle need be of wood only, with a space between the top of the butt and the cover, such space being covered with wire to keep out slugs, etc. When the storage of the rain-water is in an underground tank, this tank should be ventilated by a four-inch pipe, away out of reach. The chief polluting agent of rain-water in the country is due to the great quantity of vegetable germs from which cities and towns are far more exempt, and we do not think that soot is a factor for good, or, for the matter of that, for evil either. In many of the largest country houses in Lincolnshire and elsewhere, and in many dairy-farms, the sole water-supply is from the roofs, but in such cases the water is passed through an underground filter, built like a mason's dip-trap, filled with gravel and sand. Even then, however, the rain-water tank itself should be ventilated.]

4. The Sanitary Dictionary.

Will you kindly inform me, when we may expect a continuation of the *Sanitary Dictionary*, which has proved of great use to myself and others engaged in sanitary matters? Sigma.

[A work of this kind must necessarily be an intermittent one, so many hundreds of wood-cuts and concentrated matter requiring a great deal of time for preparation, but the balance of the work will duly appear. It was not, of course, the intention to go through the whole alphabet, but to treat upon subjects which find their range in it, and which have distinct relationships to sanitary science.]

5. Cast-Iron Drain-Pipes.

Do you approve of cast-iron drain-pipes inside houses? Alpha.

[Most decidedly, cast-iron pipes are very proper things to lay down inside the house, and provided that they are coated inside with some approved solution, which shall prevent rusting and scaling have always performed admirable work. Several English en make use of this kind of pipe, and it is also used largely in A with good results. We see no advantage in making use of th out-door work, and we cannot say that they possess any advantage over Standford's pipes, when properly surrou concrete, except that they are less liable to fracture during a sidence of the walls.]

6. The Cleansing of Water-Closets.

Is it not necessary to clean out the inside of closets by brushin occasionally? Expect

[All closets except valve-closets, and all closets made of ea of earthenware, with front, back, or side outlets, are liable to a blackness, after a short use, and this should be carefully away weekly, as it not only offends the eye, but must hav prejudicial effect upon the closet-room when exposed to the a flushing, or when, unfortunately, the trapoing water, throug fault in the flushing, is sufficient to fill only the trap below.]

NOTICES OF MEETINGS.

SANITARY INSTITUTE OF GREAT BRIT

At a meeting of the Sanitary Institute of Great B held on November 24th, Prof. F. S. B. F. De Chau M.D., F.R.S., in the Chair; the Secretary read donations to Library since last meeting, and Dr. Ben Browning, Mr. A. Roberts of Sydney, and Dr. E Smith, were elected Fellows of the Institute. Members and Associates were also elected, and Associates enrolled who had obtained the Certificate Institute as Inspectors of Nuisances. Applications read for ballot at next meeting. The Autumnal Con and Exhibition is arranged to be held at Newcastle-on in 1882.

At the first ordinary meeting of the session, held We day December 7th, Dr. Alfred Carpenter in the chair adjudicators Dr. William Farr, F.R.S. and Dr. Richard F.R.S. reported that the Wyatt Edgell prize of £100 an essay on 'The Range of Hereditary Tendencies Health and Disease' was awarded by them to the es bearing the motto, 'The subtlety of nature far exceeds t subtlety of reason'. On the sealed envelope accompanyi the essay being opened, the chairman announced the auth to be Mr. George Gaskoin, of 7, Westbourne Park. The pri will be presented by the Rev. E. Wyatt Edgell at the nex ordinary meeting, February 8th. The inaugural addres was delivered by Dr. A. Carpenter, Vice-Chairman of Council.

SANITARY JOTTINGS.

Mr. Galsworthy, the late vice-chairman of the Metro politan Asylums Board, has been elected chairman of that body in the place of the lamented Dr. Brewer. Sir R. Currie takes Mr. Galsworthy's place as vice-chairman.

The Registrar-General's Report for Ceylon for 1879 states that no less than 21.29 per cent. of the deaths in the island during that year were caused by fever, and 24 per cent. of the whole total of deaths from that disease occurred in the North-Western Provinces.

The Public Health Committee of the Corporation of Cork have recommended that a public analyst be appointed at a salary of £100 a year, with a fee of 10/6 for each analysis in excess of £100 made for the Corporation.

Mr. Edwin J. Rawson has received, for the fourth time, the Government Grant for efficient vaccination in the North Bierley Union.

The Port of London Sanitary Committee intend to represent to the Government the urgency of the sewer outfalls being removed further down the river.

A writer in the Berbice *Asylum Journal* on the subject of 'Sewage Removal for Tropical Towns' is in favour of a pail system on the Rochdale method, and its suitability to the condition of British Guiana.

The number of attendances of children at the Bethnal *crèche* founded nine years ago by Mrs. Hilton, has considerably exceeded 30,000. The number last year was 2,048.

ORIGINAL PAPERS.

HE SEED-TIME OF HEALTH.'*

JAMIN WARD RICHARDSON, M.D., LL.D., F.R.S.

eks knew that life ought to be a perpetual hey not only knew the fact, they acted up hey were equally well aware that a long and fe could alone be attained by perfection of s opening, in the seed-time of health. To iat time was, therefore, an offence against ule, against reason, against sentiment. The ge of such an event was death to the brain, the heart. In this seed-time of health the o be made, the life that was to be in truth a h living. Animals beneath men, that are f going through their appointed time, and made both useful and beautiful, must have d-time of health. Shall their human masters ared for? If the masters are to be mere es; and then it were a pity and a danger; who have no respect for life and beauty, who ough existence and grow weary of it, are to d neither with life, beauty, nor fame.

history of great truths derived from the wise times, there is not one truth so great nd not one so completely missed. It is the at was lost. In our day we have lost it so that it might never have been in existence t we seem to care. The key to all we would key to the gates of health and happiness, lost as if it had never been found.

nt of health our children in these times, s we are of these times, are a reproach. s there a healthy child? I have never seen might search through the length and breadth sland, I could not find one. You may put ne a child in all its innocence. It has done g that it should suffer; it may show to the l mind no trace of disease; and yet I know or any skilled observer were to look into the if the life in question it cannot be found in- y sound. It will have to battle with future sufficient for the soundest to meet; but it is f free from dangers other than those that are ive and avoidable. It is sure to have some l failure, and too likely some that will help ise the independent risks that lie before it.

r children under five years are expected to hat may almost be called a definite propor- He is a fortunate man who, having four born to him, retains three alive. Later on, ort time, the danger is reduced; with adoles- recurs. Again it retreats, but with such ll along the line, that one-third of the allot- the life that would be, were it planted in ealth, is only attained.

for this we have no shame. There is an y of learned men which I sometimes visit, nbly of earnest men who are bent on under- g to the full these human failures from health. nen spare no pains, and to gain a spark of l labour like miners in a mine. When last I hem a puny feeble spark of life was in their e undergoing their searching yet kindly . Except that it cried a little and laughed a changing mood, this spark of life might have been considered a pathological specimen, and in truth it was discussed as such. No one there had a thought of that small life developing into wholesome life and passing through its natural term; not one was there who did not know that the chances of bare life were impossible, and that nothing could be done to save it. The intent was to study the pathology and fix that by name. They said, when their tech- nical language was translated, 'this child is suffering from the error, some would say the sin, of its parents.' How deep did this error go? In what strange forms did it appear? How singular that the nervous system, once impressed with the poison of that error, should impress another nervous system, and so modify the nutrition of the organism to which it belonged as to cause false nutrition of internal organs and of the very bones themselves! In a whisper one of the learned expressed to another one the pity 'that such a specimen of humanity should ever have been born, to breathe and take notice, and smile, and cry, and love, and suffer, and die, and we be able to do nothing for it except hope for the relief that should end in the earliest death.'

I belong to a committee which takes under its care another class of sad childhood. The members of this community pass before us deaf and mute. We try to give them the powers of intelligent converse by laborious and artificial means, and we do some good; but the train of sufferers passes by, and we know that full half are mute from the undeveloped brain; that they are practically lost to life. It is not that the one sense is lost, and thereby the means of expression by intelligible language; it is not even that the nervous organisation which ministers to intelligence is low; it is that these deficiencies are some of the outward signs of a general deterioration of body, and that there is scarcely a structure which the eye of science would recognise as moulded in health.

Passing from the sphere of general observation, from modified to destroyed vitality, I find more startling effects at hand. A short essay reached me not long ago in which the writer epitomises the facts he has collected respecting the attainment of maturity in peoples of different nations. He tells us that of ten children born in Norway a little over seven reach their twentieth year; that in England and in the United States of America somewhat less than seven reach that stage; that in France only five reach it; and in Ireland less than five. He tells us that in Norway out of ten thousand born rather more than one out of three reaches the age of seventy; in England one out of four; in the United States, if both sexes be computed, less than one out of four; in France, less than one out of eight; and in Ireland less than one out of eleven. And he adds this significant computation, based on what may be called the commercial view of the vital question. 'In producing dead machinery the cost of all that is broken in the making is charged to the cost of that which is completed. If we estimate by this same rule the cost of rearing children to manhood, if we calculate up the number of years lived by those who fell, with the years of those who passed successfully to manhood, there would be found between the two extremes presented in Norway and Ireland,—both, be it observed unnatural,—a loss of one hundred and twenty per cent. greater in the first year of life, seventy-five per cent. greater in the first four years of life, and one hundred and twenty per cent. greater in the years between the fifth and the twentieth, in Ireland than in Norway. In Norway the average length of

ict of an Address delivered at the Brighton Health Con-

life of the effective population is thirty-nine and rather more than a half years; in England, thirty-five and a half years; in France, not quite thirty-three years; and in Ireland not quite twenty-nine years. Thus, again comparing the best with the worst of a scale of vitality in which both are bad, in Norway the proportion of the population that reaches twenty survives nearly forty years, or four-fifths of the effective period, to contribute to the wealth of the community; while in Ireland the same proportion survives less than twenty-nine years, or considerably under three-fifths of the effective period.

When we speak of families that lie within our cognizance, we estimate the happiness of the families by the health they represent. If one out of every two of the offspring of the house have died, if some who have not died are mute to the world or otherwise stricken, we soon fall into a thoughtful mood, and say that this home is not a possible home for happy life. Pleasures there may be, happiness there cannot be.

What is true of family circles is equally true of nations. Rest, quiet of nations, repose for cultivation of refined arts and sciences, happiness derived from healthy and vigorous minds and intended for healthy, vigorous, and wholesome purposes, there cannot be, when one or two of life can only reach maturity with a survival of three-fifths of effective population. In such a national family there is persistent mourning. State physicians tender their remedies for such families of nations and call themselves curers, as if that could be cured which is Nature pursuing her merciless course towards her merciful dispensations, in correction of those who have outraged her.

I have named this discourse "The Seed-time of Health," and in the sentences foregone I have tried to strike a contrast, and thereby to give to sanitation a broader meaning as a practical science than is commonly connected with it as a system of details respecting ventilations, sewer traps, and the like.

I want to point to health as the all-in-all to man; the gate of health, leading to the truly good in politics, art, science, letters,—aye, and religion, not less than the least of everything. The strain of my argument is, that, unless we make the early life of our children a seed-time of health,—unless we, from the root of life, so change the conditions which now exist,—all our other measures are practically valueless.

At this moment we have not, as a nation, got this notion set in our minds in such degree as even to accept it, basic as it is, as worthy of serious thought. We have no shame when our young fail and die. Grief we have, fond memories we have; but shame, none. We bury our young as if the act were natural, and erect memorials of it. We read obituaries of the young dead; we read the terrible obituaries of the Registrars-General; we discuss in Congresses like these the cost of young life; but the shame of the Greek touches us not. The knowledge of the troubles which flow from the lack of the shame reaches us not.

We sanitarians are, however, only bound to treat of that which belongs to our own labours, and acknowledging the perils incident to early life, and it may be even recognising the shame of them, have before us the question of their prevention from its health side alone.

That we may approach this task with intelligence, let us for a short time glance at the nature of the perils which beset the spring-tide of human life, and the period bounded by maturity.

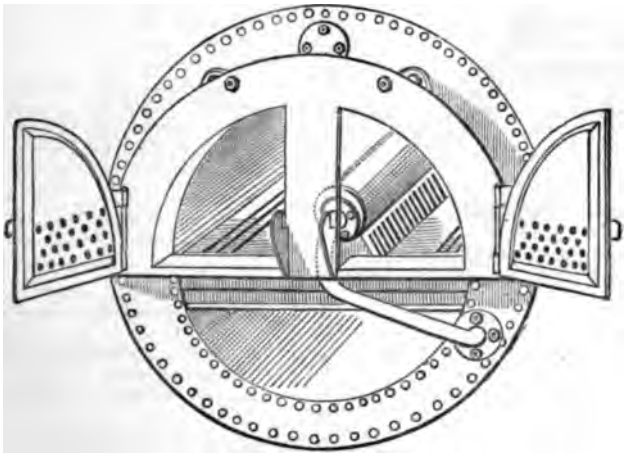
The perils are of four kinds:—1. Those that are inherited; 2. Those that are accidental; 3. Those that are inflicted; 4. Those that are acquired.

Inherited Perils.—Foremost amongst the perils to life, in all its stages, but especially in its early stages, are the inherited. We may safely say that no one is born free from taint of disease, and we may almost say with equal certainty, that there is no definable disease that does not admit of being called hereditary, unless it be accidentally produced. To what is known as specific disease, the disease of diseases; to struma, or scrofula, and its ally, if not the same, tubercular affection; to cancer; to rheumatism and gout; and to alcoholic degeneration, the grand perils of life are mainly due. These are the bases of so many diseases which bear different names; these so modify diseases, which may in themselves be distinct, that if they were removed the danger would be reduced to a minimum. These diseased conditions do not, however, exhaust the list of fatal common inheritances. On many occasions, for several years past, I have observed, and maintained the observation, that some diseases, which are to be noticed in a coming page, as communicable, infectious, or contagious, are also classifiable under this head. I am satisfied that quinsey, diphtheria, scarlet fever, and even what is called drain fever, typhoid, are often of hereditary character. I have known a family in which four members have suffered from diphtheria, a parent having had the same affection, and probably a grand-parent. I have known a family in which five members have, at various periods, suffered from typhoid, a parent and a grand-parent having been subject to the same disease. I have known a family in which quinsey has been the marked family characteristic for four generations. These persons have been the sufferers from the diseases named, without any obvious contraction of the diseases, and without having any companions in their sufferings. They were, in fact, predisposed to produce the poisons of the diseases in their own bodies, as the cobra is to produce the poisonous secretion which in its case is a part of its natural organisation.

Accidental Perils.—Next amongst the perils which beset the early life are the accidental dangers to which it is exposed. I do not mean by this the mere physical accidents, the troubles and blows to which childhood is subjected. Not these alone, but the more subtle accidents which are incurred through exposure to vicissitudes of season, and the influence of those particles of the communicable diseases, which, being introduced into the body, incubate there, and transform the secretions of the body into poisons like unto themselves. A long list of diseases incident to the spring-time of life is found in these two classes of causes of diseases, those due to the contagious particles, numbering from three to five to thirty alone.

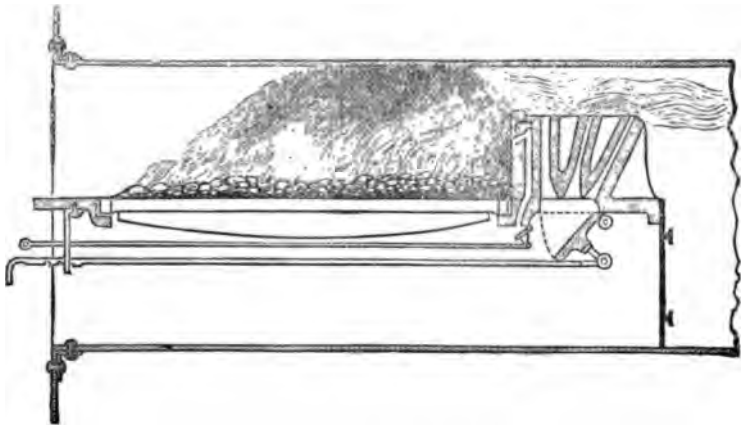
The grand mortality of the child period is due to the two classes of causes now under consideration. From exposure to the vicissitudes of season comes, foremost of all, that first step into so wide a universe of evil, the common cold, or catarrh. Upon that comes the continuous visitation which, extending to the pulmonary surface, causes bronchitis, croup, pneumonia, tubercular inflammation; or, extending to the mucous surface of the intestines, causes irritation there, diarrhœa and cholera affection. From exposure, again, to the poisons of the communicable diseases, there are produced the long and fatal calendars of diseases of shortest incubation,

is certainly unique, and we should imagine very effective. The accompanying sketch represents it in connection with a single flued Cornish boiler, a glance at which will show an almost entire absence of bottom bars, but a sufficient quantity of warmed air to produce perfect combustion



is admitted to the fire by means of double bars running the entire length, and placed upright in the centre of the furnace, virtually dividing it into two parts; the apertures in these bars are vertical, thereby producing two distinct lateral currents which pass up the sides and unite at the top of the furnace. Above these bars is a tube connected at the back with the upper part of the boiler, and in the front with the lower part, a thorough circulation being the result, and by the time steam is generated the water in the bottom of the boiler is more than 200°, consequently the temperature of the boiler-plates is even throughout, which is a great point in its favour.

Not the least important among the smoke-consuming and fuel-saving apparatus specially adaptable for hand-fired Cornish or Lancashire boilers is that patented by Messrs. Cubb and Co., of 28, New Bridge Street, Blackfriars, E.C. The apparatus in question forms the bridge to the furnace and is so constructed as to admit three or four currents of air to meet the carbon and other unconsumed gases from the fuel just as they are passing on to the flue, and but for this arrangement finally to discharge themselves themselves in dense black volumes from the chimney stack. Happily, however, by means of this invention the smoke is not only arrested but consumed, for the air in its



passage to the bridge flows under the fire bars, which being of a deep section cause it to attain to such an intense heat that it immediately mingles with and ignites the unconsumed products, resulting in perfect combustion. A glance at the illustration will show two dampers which are regulated at will by the stoker. The principal object of the small front damper which allows air to enter the air chamber formed in the brickwork, and throw several tongues of air upon the fire, is when the fire is very black, to circulate the smoke, and by this means to greatly facilitate the efficacy of the other part.

The Patent Steam Boiler Co., 28, Heneage Street, Birmingham, show the Patent Root Boiler, which it is not necessary for us to comment upon, as it has now been in successful operation for some years. This firm also show a mechanical stoker applicable for the above or any other furnace; the construction of it is simple, and the working parts few and strong, thus rendering it almost exempt from casualities.

Mr. J. Tenwick of Grantham exhibits specimens of his patent Coal-saving Fire-bars, which are suitable for boiler and other furnaces, baker's ovens, etc, and can be fixed in lieu of existing ones without any alteration, which is an advantage not to be lost sight of. They are of an angular section, the top portion being provided with a number of diagonal slots, so that an uniform admission of air is obtained, thus facilitating the complete combustion of the fuel.

Another important appliance made by the above manufacturer is a patent Feather-balance Smoke-preventing Furnace Door and Front. The door can be opened either at the top or bottom, thus giving the stoker perfect control over the furnace, to prevent smoke.

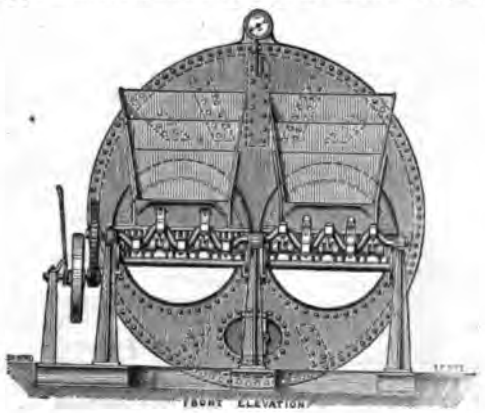
Mr. Jas. Moore of 18, Railway Street, Bromley-by-Bow, E., has a model demonstrative of his patented improvements for the economisation of fuel and the prevention and consumption of smoke in internally fired Cornish boilers. The most important feature in this invention is the fire-brick diaphragms, the number of which is determined in accordance with the length of each particular boiler. A steam tank is fitted in the second of these par-

titions, which is entirely independent of the boiler, and, in about fifteen minutes after the lighting of the fire is fairly in action, thus preventing the formation or escape of smoke. This patent is applicable to various kinds of furnaces, and may be seen in operation at the above address.

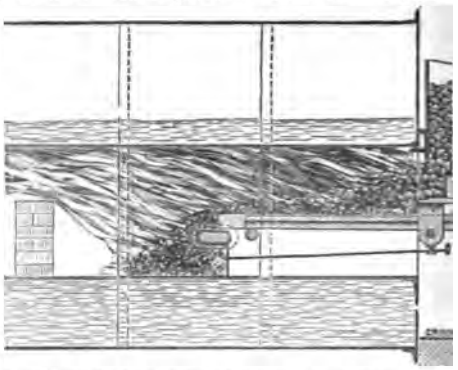
Geo. Waller and Co., of Holland Street, Southwark, S.E., shew Smith's Patent Mechanical Stoker. In this, as in most of its kind, the fuel is supplied to the furnace by a hopper, the quantity being regulated by suitable machinery which, at the same time, imparts an up-and-down, and a backward-and-forward motion to part of the bars in this case, the alternate ones being stationary. The result of the combined movements being to break up the body of fuel, rendering clinkering unnecessary, and also preventing smoke. A special feature in this appliance is in the bars being made hollow, a small jet of steam travels along them, keeping them cool, and made to pass out at the side as to increase the draught, and improve the combustion.

The Great Britain Smoke-Consuming and Fuel-Saving Company, St. Stephen's Chambers, Telegraph Street, Bank, E.C., exhibit an appliance radically different from anything else of the kind. It consists of two globes, which are fixed on either side of the furnace-door; in each of these a steam-jet is fixed, and communicating with them is a pipe from the boiler. Below the globes are cylinders about 16 in. long, and 2 in. in diameter, open at the bottom. Directly steam is admitted into the globes the air therein is at once exhausted, and consequently fresh air rushes up the cylinders to supply its place, by means of which oxy-hydrogen gas is found, and the products of combustion thoroughly consumed. It only remains to be said that the above apparatus can be fitted in a few hours at a trifling cost.

Mr. G. Sinclair of the Albion Boiler Works, Leith, exhibits his Patent Mechanical Self-Acting Stoker and Smoke-Consuming Appliance, which is adaptable for all kinds of internal and externally-fixed boilers, brewers, coppers, etc., and worth the consideration of all steam-users. One of the principal advantages of this invention is, that it is practically smoke-preventing. This end is attained by means of a Hopper attached to the front of the boiler and in front of each



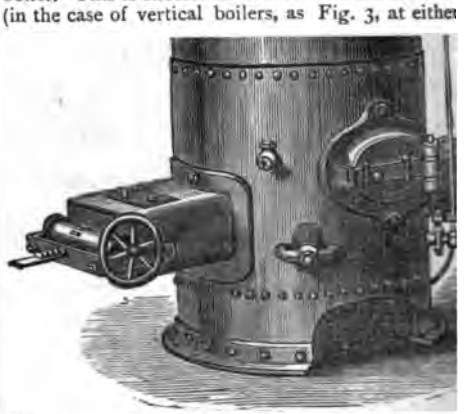
furnace, thus keeping out all undue admission of cold air, and virtually coking the coals before coming in contact with the fire, the result being that the gases are consumed and burnt, and no smoke being formed, there is absolutely no waste. The result is a considerable saving of fuel, and the maintenance of a steady steam pressure. The stoking arrangement is ingenious, yet at once simple and efficient. As will be seen by the drawing, a cranked shaft is fitted in front of each furnace, which by connecting rods works the fire-bars backwards and forwards, imparting at the same time to them a slight up and down motion, the result of the combined movements being to thoroughly break up the clinkers and deposit them in the ash-pit, and to admit a constant yet only sufficient stream of cool air up through the fire, thereby rendering it always clean. Fresh fuel is supplied by means of a pushing plate in the bottom copper, which is also propelled by connecting rods one shaft. An important feature of this patent



should not be lost sight of, is a cooling pipe at the the furnaces wherein water is circulated from the counteract the heat produced from the collecting n clinker.

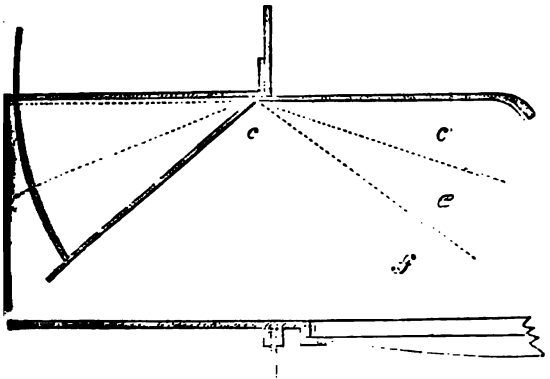
Messrs. Knowles and Halstead, Globe Works, N ham, Bradford, show the 'Helix' Furnace Fe means of which fuel is admitted up through the burning all the products of combustion and pr the formation of smoke. This is effected as fol Instead of the furnace floor consisting entirely of some are omitted, and in their place long troughs a tapering from front to back; in each of these a screw is introduced, which, by suitable machinery the fuel from a hopper fitted in front of the boiler, it upwards and forwards in regular quantities i furnace. A backward and forward motion is a parted to the fire-bars which carries the fuel on to diary grate at the end of furnace; this can be ti when the fireman wishes to remove the clinker, reducing the pressure of steam.

Mr. Engert's (Three Mills Lane, Bromley-b recently patented invention for the prevention of and the better consumption of fuel, is well worthy o not only for domestic fire-places, but for all steam boilers and furnaces, both stationary, loco and marine. The principle of it consists in suppl fuel, which in the case of boilers may be the coa slack, to the fire in such a manner as to prevent t from condensing and cold air from rushing in to boiler. This is effected as follows: an iron box is (in the case of vertical boilers, as Fig. 3, at either



about the ordinary level of the fire, the coals being from the top of same, and by means of a lever and plate being, as it were, pushed into it, but not until become thoroughly *coked*, thereby utilising all t giving parts of the fuel, and forming little or no For furnaces, the application differs in the 'box' be

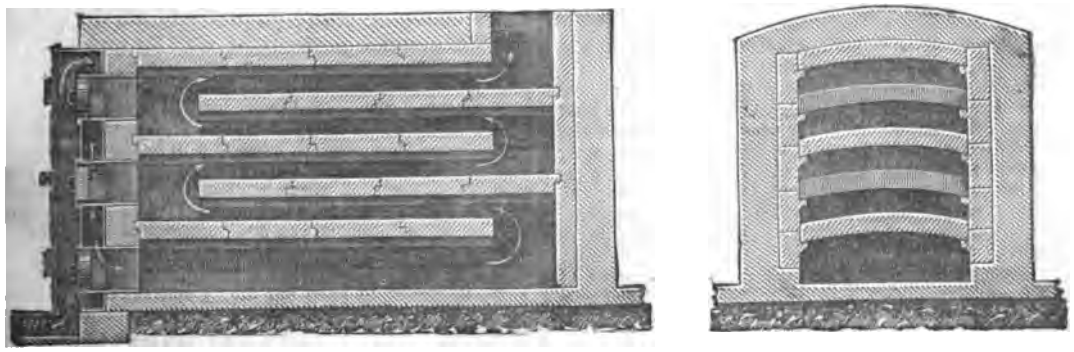
in the front of the fire bars in lieu of the ordinary doors; and within it, instead of the movable plate, an angular shutter is introduced, resting on pins, and attached to a ratchet in front to regulate its movements. In the diagram,



B is the shutter, which, when the fire requires feeding, is brought to the points D, the front part coming close to top of box, and the corresponding part at back resting on the fire; the fresh coals are then thrown on, the front doors are shut, and after a few minutes the shutter is lifted from the fire, and but little smoke is visible. It will be seen that by this simple apparatus the cooling of the boiler is avoided, and the gaseous parts of the coal fully consumed. For domestic grates and kitcheners the 'box' is fixed at the back, and worked by a simple arrangement projecting from under bottom bar of grate, or in the case of kitcheners by a lever at the back of the hot plate. Any kind of coal may be used with this apparatus.

M. Michel Perret, of Paris, represented by Messrs. B. H. Remmers and Co., Glasgow, his sole agents for the United Kingdom, exhibits two apparatus of undoubted merit in this department. One of these, named the 'Grille Immergée', from the lower portion of the bars being immersed in water, consists of a square wrought iron tank, with an inch or two of water at the bottom, in which longitudinal plates of iron connected with the bars rest. The latter are composed of round iron about 1¼ inch diameter, to each of which is attached a cast-iron plate of iron about ⅞ inch thick and about 15 inches deep, which rest in the water at the bottom, and each plate has two longitudinal slits in it about 9 inches long for the better circulation of steam and hot air. The top portion of the bars are placed so close together that although there is a small interstice between each, it is so minute that no fuel can pass through them. The furnace is built up in the ordinary way above the apparatus. Fuel of the commonest kinds can be burnt in it, and the action of the water, which quickly becomes heated on the iron, by generating steam, prevents the bars from becoming overheated, and consequently from burning away, and, what is of greater importance in connection with all furnace bars, arrests the deposit of clinkers upon them. In other words, it may be said that the heat communicated from the fire bars to the water, throws a small portion into steam, which passing through the fire, splits it up or separates it into its constituent gases, burns the hydrogen, and promotes combustion generally, the main feature obtained being not only economy in fuel, but perhaps a still greater saving in fire bars and general attendance. No less meritorious in its arrangements is M. Perret's patent Multiple Stage Furnace for disseminating hot-air by means of pipes throughout a building or for malt kilns, and the numerous drying processes required in different manufacturing businesses. The furnace, built of brick work, is enclosed in front by a cast-iron door, having four small ones in its elevation with ventilators for admitting air, and an outer one with similar arrangements. The interior is composed of four fire-clay stages or shelves, slightly arched, and an ash-pan; and the idea sought to be taken advantage of, viz., that fire-clay has an immense regenerative power of first absorbing heat, and then giving it off slowly. At first, lighting it is effected at the bottom until the first stage becomes red-hot; a small quantity of fuel is then spread over it, and in due time the second is similarly heated, and so on to the top, when the whole will be formed into incandescent mass. Now the process is reversed, the furnace being fed from the top stage. Step by step, as required, the burning mass of fuel is gradually raked downwards to each successive stage; and to give an idea of the length of time it lasts, under ordinary circumstances, 72 hours elapse before the top layer of fuel reaches the bottom stage, from whence it falls to the ash-pit, and is taken out looking very much like sand; in fact, it has been used for mixing with mortar in the Exhibition in building up some of the brick-work. The fuel employed is mere refuse, such as has comparatively no commercial value, and what is being used at the Exhibition has cost only one shilling per ton, and is the veriest rubbish with any pretensions to coal dust that we ever saw. But there are thousands of tons of this rubbish to be obtained almost for the carting from every coal mine and gaswork, which in apparatus of this character can be utilised to the greatest advantage. One and a half cwt. of this fuel will last for 24 hours, and its use should inaugurate a new era in heating apparatus in this country.

Messrs. Ireland and Lownds, Engineers, West Street, Leek, Staffordshire, exhibit a Patent Metallic Tubular Bridge for the prevention of smoke in steam boiler and other furnaces, the principal advantages of which are that it is perfectly self-acting, and can be accommodated to any



strength of draught, while the air for the consumption of the free carbon is heated to such a degree, as to effectually secure the consumption of about 90 per cent. of the smoke.

The Patent Improved Self-Stoking Smokeless Furnaces of Messrs. T. and T. Vicars, of the Wheat Sheaf Foundry, Seel Street, Liverpool, are well known, something like 1600 of them being in use. In common with self-stoking furnaces generally, the fuel is supplied to the fire by means of a large hopper, from which it is delivered in any desired quantity on to a plate immediately in front of the

bars, where it becomes coked before passing on to them, which, however, it eventually does, and by their motion is carried to a grated plate at the back, where the combustion being completed, it falls into the flue, from whence the clinkers can be removed as often as desirable without the necessity of opening doors and admitting volumes of cold air inseparable from hand-firing. We understand the firm have been engaged upon these appliances for the past sixteen years, during which time they have introduced various improvements, the present excellent exhibit being the result of these prolonged experiments.

Another admirable smoke preventer and mechanical stoker is that known as McDougall's Patent, manufactured and exhibited by the Chadderton Ironwork Company, Limited, of Chadderton, near Manchester. As is the case with the other mechanical stokers we have referred to, the fuel is put on by means of a hopper, fixed, in this instance, at a more convenient height than some we have noticed in front of a furnace. Upon the bottom of this a ram works to and fro, the face of which is fluted and case-hardened, serving the double purpose of crushing any lumps too large to pass the aperture, and regulating the supply into the furnace. The fire-bars are actuated by an eccentricated shaft, the eccentrics being of different centres and arranged alternately. By this means the fuel is carried forward, and by the time it reaches the bridge has assumed the form of clinker, and so is finally pushed over into the flue. Wherever these have been fixed, universal testimony is given to their smoke-consuming powers and saving of fuel. Amongst other places, we may mention that sixteen of them are in use at the well-known paper mills of Mr. E. Lloyd, who speaks of them in the highest terms.

Blocksage's Patent Smoke Burner and Fuel Economiser, shown by Mr. John Collings, Wallshaw House, Oldham, is an apparatus, without the use of machinery, for the prevention of smoke in all kinds of furnaces. It consists of an inclined oven placed in front of the boiler, and fired by hand in the usual way. The top and sides of this oven are lined with fire-clay blocks, which, becoming intensely hot, burn the smoke naturally impinged against them from the sloping nature of the bars, and perfect combustion is thereby attained.

A smoke-consuming furnace worthy of notice is that exhibited by Mr. C. B. Gregory of Beverly, New Jersey, U.S.A. The one shown is in a portable form, mounted upon wheels to facilitate removal; it is about 3 feet square, and stands 4 feet from the ground, but is adaptable for all practical purposes industrial and domestic. In the front of the furnace may be seen several doors for the purpose of regulating the supply of air, or for otherwise getting access to the fire-box, which is situated near the centre; immediately above this, and inclining to the back of the furnace, is the combustion chamber, while in the front and at the top is a hopper; in this the fuel, which may be any kind of coal or even refuse matter, is placed. By this means the gases are drawn through the fire, and, for the most part, consumed; but before entering the flue they are met by strong currents of air, heated by having passed around the fire-box, thus destroying any carbon remaining unburnt. That this may be patent to all, the flue-pipe where it leaves the furnace is enlarged to 12 ins. diameter and 2 ft. high, fitted with talc windows; and the other end, instead of disappearing through an aperture in the ceiling, terminates a few inches below it, and the absence of any deposit thereon speaks well for its efficiency.

A description of the remaining exhibits and such tests as may be completed at that time will appear in our next issue.

(*To be continued.*)

The Local Board of Ashford, Kent, after much discussion and several visits to other sewerage works, have decided, subject to the sanction of the Local Government Board, to adopt, for the disposal of the town sewage, precipitation by means of sulphate of alumina and lime, and filtration by passing the effluent through land.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A meeting of this Society was held on Friday, November 18th, Dr. J. W. Tripe, President, in the chair. A report from the Council was brought up, recommending that the published *Transactions* of the Society should contain a fuller account of the discussions which take place before 8 p.m., as well as of the discussions on the papers which are read subsequently.

The following gentlemen were elected members of the Society:—Mr. H. J. F. Groves, Medical Officer of Health for Lambeth, as a Metropolitan Member; Mr. G. H. Fosbroke, Medical Officer of Health for Stratford-on-Avon; Dr. A. Downes, Medical Officer of Health for Chelmsford and Maldon; Dr. Simpson, Medical Officer of Health for Aberdeen; and Dr. Hime, Medical Officer of Health for Sheffield, as extra-Metropolitan Members.

A letter was read from the Société Française d'Hygiene, of Paris, with a diploma, conferring the honorary membership of the Société on the Society of Medical Officers of Health.

A letter was read from a correspondent asking how near to a small-pox hospital, in the opinion of the Society, it would be safe for a dwelling-house to be built, and stating that the writer had objected to a house being built within a hundred yards of a hospital for infectious diseases in the town in which he was Medical Officer of Health. On the suggestion of Dr. Dudfield, it was decided to inquire of the writer whether any local bye-laws or regulations existed, which could limit the proximity of a dwelling-house to such a hospital.

Reports on Infectious Diseases.—Mr. Jacob called attention to the valuable reports on infectious diseases which were, from time to time, made by the medical inspectors of the Local Government Board to that Board, and expressed his regret that outside the officers of the Board these reports were barely heard of. He thought the subject was one deserving the attention of the Society, and moved that the Council should be requested to advise what steps should be taken with a view to placing copies of these reports within reach of Medical Officers of Health. The proposal was seconded by Dr. Dudfield and agreed to.

Ventilating Shaft for Sewers.—Dr. Corfield introduced to the Society Mr. Robert Parker, Surveyor to the Board of Works for the Poplar district, who exhibited a model of ventilating shaft for sewers. Mr. Parker, after referring to the evidence which existed that either the air of sewers or particles carried by such air was injurious to health, pointed out that the only means by which such air could be kept from becoming offensive was by diluting it, keeping it in motion, and ejecting it from the sewer. A short account was given of the ordinary methods of sewer ventilation, and the speaker claimed for his own method that it was more perfect, and that for its adoption it was not necessary to make many alterations in existing sewers; the principle can be applied to all, no matter how defective their construction may be. What is wanted to keep our drains and sewers free from gas is a force to drive out whatever gases may be within the sewers and keep up a constant current of fresh air through them. Mr. Parker proposed to utilise for this purpose the force of the wind, which is a constant force, with an average velocity in England of from six to eight miles an hour. It would be necessary to have a number of cast iron shafts erected, twelve feet high and ten inches in diameter, in convenient and open places, and also pipes of various sizes, according to circumstances, from the sewers and existing drains at the rear of houses to the house-top, as high as the chimney stack, and these pipes or ventilating shafts should be surrounded by a cowl, guided by a vane attached to it, so that its opening or aperture should always be facing the wind; the air or wind impinging on it will force down

e air within it, and pass into the sewer, and travel along , entering all drains and ramifications to find an outlet,) that it may escape. A number of experiments have een conducted under Mr. Parker's superintendence to ee if the force of the wind and air could be conducted into he sewers, and it was found there was always a downward urrent in the ventilating shaft, and an upward rush of pure ir in all the gulleys and drains in its immediate neighbour- ood. Mr. Parker then exhibited a model of his cowl, nd gave the result of various experiments showing the elocity of wind in a sewer thus treated at varying diffe- ences of temperature in and outside the sewer, and with arying velocity of wind.

Mr. BLYTH asked whether this method was serviceable when the atmosphere was still, and was informed that it was not, but that it acted with a velocity of air of even less than two miles an hour, and that, as a matter of fact, the air was almost never still.

In reply to Dr. James Stevenson, Mr. Parker stated that the ventilating shafts would be placed at the backs of houses.

Dr. TRIPE said there was no doubt that Mr. Parker was correct in his view that the only method of keeping the air of sewers sweet was to constantly change it, but that if this method were to be adopted it would be necessary to place Mr. Parker's apparatus at the lower levels, so as to permit the air to escape at the upper level of the sewer. He referred to a furnace which had many years ago been placed at the higher end of a sewer with a view to burning air which was supposed to come from a sewer at this point, whereas, as a matter of fact, the air entered the sewer at this point, and did not escape. He objected to Mr. Rogers Field's system of disconnecting the house-drain from the sewer, except in ases where the sewer was badly constructed. In his pinion, the air of sewers was much more harmless than hat of drains, and urged the necessity of drain ventilation.

Dr. DUDFIELD thought there was much evidence that ewer air was not harmless, as people working in sewers uffer from the effect until they become acclimatised.

Dr. CARPENTER thought that the best method of sewer entilation was that which took advantage of the natural irculation of the air from the low to the higher level. If very soil-pipe were ventilated, and no sewer were allowed o cause deposit, no other apparatus would be required. He had known charcoal trays placed over openings at the ewer level of a sewer with a view to preventing offensive mell, but they only acted as impediments to the entrance air.

Dr. CORFIELD agreed generally with Dr. Carpenter, and expressed the opinion that with regard to house drainage an opening at the low and at the high level presented a perfect ystem of ventilation.

In reply to Dr. Dixon, Mr. Parker stated that the appa- atus would remain a long time in good working order.

ENTERIC FEVER.—Mr. SHIRLEY MURPHY exhibited diagram, showing the behaviour of enteric fever during ach week of the present and ten preceding years; the ean temperature, barometric pressure, and the rainfall r each of these weeks were also shown.

Dr. TRIPE, in moving that the diagram be published, oted the fact that during the first three quarters of the resent year the number of deaths from this disease was uch below the average, and that it was only in the fourth uarter that they were so much more numerous than usual. He also gave the distribution of cases admitted into the Lomerton Fever Hospital.

TYPHUS FEVER IN MARYLEBONE.—After a few words om Dr. Buchanan, at the invitation of the President, Mr. WYNTER BLYTH gave some account of the outbreak f typhus which had recently occurred in Marylebone. he first case occurred in August. There had been one ase in Beaumont's Buildings in 1878, but since then one until the present outbreak. It began in a colony f Irish, and extended down one side of a street; all he inhabitants of this street might be regarded as one ousehold, owing to the manner in which they communi- ated with each other. He thought small-pox and yphus spread owing to the inability of the legislature to eal with the person. It is first necessary to remove the sick person to the hospital and then to disinfect his room; for this purpose his family must be turned out, often into the street. The bodies of these people should be disinfected, but this, of course, could not be done. Mr. Blyth thought more power was needed to deal with infected clothing and infected persons, and suggested that it would be well if, when typhus existed in an area, powers could be received from a magistrate for burning old clothes, pro- viding new ones, and washing the bodies of those who dwelt in the infected area. He also spoke of the great difficulty there was for those who had not seen typhus to recognise the disease under all circumstances.

Dr. BUCHANAN suggested it would be interesting to the Society if Mr. Lovett would give his experience of existing laws in dealing with outbreaks of typhus.

Mr. LOVETT stated that each outbreak with which he had had to do had begun in a condemned area, but that as soon as the sick were removed to hospital, and the houses closed under a magistrate's order, the extension of the disease was checked. He thought Torrens' Act, as it now stood, could not be of much help to health officers.

Dr. BUCHANAN raised the question whether the present prevalence of enteric fever might in any part be due to cases of typhus which had not been recognised.

Dr. DUDFIELD was of opinion that the existing laws would be found to be of much avail in limiting an outbreak of typhus, and that health officers would not be dealt with very critically if they went beyond their legal powers at the time of a great emergency.

ENTERIC FEVER AND CONTAMINATED WATER-SUPPLY. —Dr. CARPENTER discussed the prevalence of enteric fever in association with contaminated water-supply.

Mr. SHIRLEY MURPHY said that so far as the St. Pancras cases were concerned they were certainly enteric, and did not appear to be due either to contaminated milk or water-supply, but they occurred at distinct intervals between successive cases, corresponding with incubation periods, and that he had noted the frequency with which one case was followed by others in the same house, though whether more so than usual his experience did not warrant him in saying.

Dr. CARPENTER, in reply to Dr. Dudfield, made a few remarks on the Royal Commission appointed to consider metropolitan hospital provision for infectious diseases.

MILK-CONTAMINATION.

The following memorial has been presented to the President of the Local Government Board by the North Western Association of Medical Officers of Health:—

'To the Right Honourable J. G. Dodson, M.P., President of the Local Government Board. The Memorial of the North Western Association of Medical Officers of Health respectfully sheweth:—That your memorialists are a body of Medical Officers of Health, practising in the counties of Lancaster, Chester, Derby, and the West Riding of the County of York. That your memorialists having evidence that certain epidemic diseases, as scarlatina and typhoid fever, are not infrequently spread by means of milk, and holding that certain epizootic diseases, as foot-and-mouth-disease, may also be occasionally spread by means of milk, and believing that the powers Local Authorities already possess are inadequate to prevent the specific contamination of milk, or its sale when contaminated, would urge upon your Honourable Board the desirability of taking steps to provide Local Authorities with additional powers; that is to say:—1. To enable Local Authorities to require all licensed milk-sellers to notify all cases of infectious disease appearing on their premises, with ability to close their premises till the removal of the infected animals or persons, and the disinfection of the premises. 2. To enable Local Authorities to veto the sale of milk by vendors coming from without such Authorities' boundaries. Your memorialists would also urge upon your Honourable Board that Local Authorities should be notified by memoranda or otherwise, to put in force the powers they at present possess for the efficient inspection of milk, enjoining in particular:—1. That proper inspectors be appointed; 2. That the fix-

tures of premises proposed to be used for dairy purposes be referred to the Local Health Officer to determine; 3. That the storing or selling of milk in general shops be prohibited; and 4. That samples of milk be taken for analysis from time to time from all licensed vendors in a district, and not merely from those against whom specific complaints have been made. Your memorialists therefore earnestly pray that these propositions of your memorialists may have your careful attention. And your memorialists will ever pray, etc.

(Signed on behalf of the North Western Association of Medical Officers of Health.)

G. A. KENYON, *President.*
FRANCIS VACHER, *Hon. Sec.*

24th Nov. 1881.

VENTILATION AND SEWAGE.

Lieut.-Col. Thorneycroft, who has always been one of the foremost advocates for sanitary reform in Wolverhampton, recently delivered a lecture at the Free Library of that town upon 'Ventilation and Sewage.' In the course of his remarks, he drew attention to the new law with reference to the propagation of infectious disease lately promulgated in Wisconsin, and also to the New York plumbing inspection law, both of which have been published in the columns of the SANITARY RECORD. Colonel Thorneycroft proceeded to call attention to the new Sanitary Protection Society which had been formed in Wolverhampton. Finding that the voluntary association crept on so very slowly, he was interesting himself to get a system of compulsory investigation of all houses and places where people congregated, so that neither poor nor rich would be allowed to remain in a dangerous state any longer. As regarded sewage, the best plan, in his opinion, was that which sent the water away, and left the solid matter behind, available for the land. The lecturer concluded by saying that the best way for testing sewers was by forcing sulphur into the pipes. If there was then any leakage it would soon be found out.

TESTING TRAPS.

Some recent experiments made at Penton Place, Kennington, by Mr. Pullen and Mr. Davies, fully justify the condemnation of the ℧ trap as a filth accumulator, quite unfit to be used under any water-closet apparatus. When ink or paper was placed in the trap, it was clearly demonstrated that three or four full flushes of water were required before the water in the trap was left clean, and when it is remembered that in ordinary use one flush only is employed, it requires but little intelligence to understand that the ℧ trap must necessarily be, as we have previously described it, 'a filth accumulator'.

Some further experiments were made with ⅁ traps, and although these were imperfectly carried out, and failed to convince many practical plumbers who witnessed them that a ⅁ trap could not in any circumstances be safely placed under a valve closet, they showed the necessity for a thorough knowledge of the principles and practice of trap ventilation and sanitary plumbing.

It will be remembered that in the recent lectures given under the auspices of the National Health Society, Mr. Hellyer did not advocate the use of ⅁ traps under valve closets. In all the diagrams in Mr. Hellyer's book the 'V dip' or 'anti-℧ trap' is shown in such positions.

The National Health Society have under consideration the establishment of a school for the practical teaching of sanitary plumbing.

The Guardians of the Battle Union have been requested by the Local Government Board to state their reasons for electing a gentleman as Medical Officer to whom the Central Board had already expressed an objection on the ground that he already held the appointment of Sanitary Inspector of the Union. The reply of the Battle Guardians was that the Medical Officer was elected by a majority of the Board, and they regretted that they could not give further reasons.

LAW REPORTS.

GASTRIC OR TYPHOID.

In a case recently heard at the Edinburgh Police Court, a medical practitioner was prosecuted for not having given information under the Local Act of 1879, of a case of infectious disease under his care. He contended that it was a case of 'gastric' fever, and as such, not coming under the operation of the Act. The Medical Officer of Health held that it was a case of typhoid, and that the terms 'gastric' and 'typhoid' fever were synonymous. This was the view accepted by the Sheriff, and a fine of ten shillings was inflicted on the defendant, who gave notice of appeal.

PROSECUTION FOR THE EXPOSURE OF INFECTED PERSONS.

A case has recently been brought before the petty sessions of Rochford, in which the Sanitary Authority of Southend prosecuted a visitor who, having a child ill of scarlet fever in the place, determined, notwithstanding the precautions of the Medical Officer of Health, to remove it to London; and did so, exposing it while in an infected state, first at the railway station, and afterwards in the train during the journey. The Tilbury and Southend Railway Company also prosecuted for the exposure of the case in the railway train, no information having been given to the Railway Company, so that they were unable to disinfect the carriage used. Both cases were proved, and fines and costs were made on the defendant amounting to £8 7s. 6d.

THE NOTIFICATION OF INFECTIOUS DISEASES.

Mr. F. W. Wright (Derby), has been summoned at the Derby Police Court, under the Derby Improvement Act of 1879, for neglecting to give notice of a case of typhoid fever at 28, Mansfield Road. The chief sanitary inspector (Mr. Clarke) stated that Mr. Wright had given the Sanitary Authority every assistance, but he appeared to consider that the proper time for notice to be given was after the patient had recovered. The Sanitary Committee, however, contended that the Act was passed for the purpose of getting the earliest possible information, and the Act stated that notice should be given as soon as the medical practitioner became aware of the nature of the disease.

Mr. Wright considered that the Sanitary Authority had no business in the room until the medical man had left it. On that ground he had never sent certificates to the Sanitary Authority until he had ceased visiting the patient. Disinfectants were used throughout, and never absent from the room. The magistrates said Mr. Wright had not complied with the requirements of the Act, and fined him ten shillings and costs.

At the same time, a man named Job Lean was summoned for neglecting to report to the Sanitary Authority the existence of scarlet fever on his premises. Defendant had removed from a house in which his child had been attacked with scarlet fever, and on the same day another family went into the house vacated, having no idea that the place was infected with fever. The child had been taken to a homœopathic chemist, who said that the child was feverish, but it had not been seen by a registered medical practitioner. The defendant in this case was fined five shillings and costs.

BRIEF NOTES OF USEFUL CASES.

RATING OF MARKET.

1881. *Bedford (D. of)* v. *Strand Union.* Covent Garden Market—Freeholder held rateable for certain Tolls arising out of the occupation of particular spaces of ground, although market tolls ordinarily are not rateable because incorporeal. (At Q. Sess.) (*Times*, March 19, 1881.)

CONTRIBUTION FROM OVERSEERS.—RATES.

1860. *City of London Union* v. *Acocks.* 22 & 23 Vict., c. 49, s. 6—A call on a parish in a Union for a contribution based on an estimate which includes a balance left over

preceding half-year is a valid call. (8 C.B. (N.S.) V.R., 608; 24 J.P., 502; Head-note in 8 C.B. L.)

RATING OF DRILL SHED.

C.O. of 18th Middlesex Rifles v. *Hendon Union.* eer Act, 1863," s. 26—Drill shed sometimes used Tennis, held rateable because so used—Cottage by sergeant in charge held exempt as necessary fe keeping of stores. (At Q. Sess.) (44 J.P., 698.)

LEGALISATION OF A NUISANCE.

Dewell v. *Saunders.* The erecting of a new ouse by the Freeholder of a Manor is not a common inquirable at the leet; but if the pigeons fly abroad mage of the King's subjects, the Judges of Assize cognisance of it. (Cro. Jac., 490.)

NON-PAYMENT OF RATES.

Juson v. *Dixon.* A collector of taxes may distrarrears the goods of a third person found on the though only borrowed by the debtor, and though or has other goods of his own on the premises to satisfy the arrears. (1 M. & S., 601.)

LOCOMOTIVES ON ROADS.

Parkyns v. *Priest.* "Locomotive Acts," 1861), 1861 (ss. 3, 4, 7,) "Highways and Locomotive 8," ss. 28-9, 38—Tricycle propelled by steam invisibly by means of a spirit-lamp, held within —Conviction affirmed. (50 L.J., Q.B.D., 648; Q.B.D., 313; 45 J.P., 452.)

APPEAL AGAINST RATES.

Reg. v. *Kent JJ.* "Union Assessment Act, 18—" Failure to obtain relief" before Assessment e—Appeal to Sessions on part only of grounds fore the Committee—Appellant held entitled to (40 L.J., M.C., 76; L.R., 6 Q.B., 132.) [*Reg. idgeshire* dissented from.]

CORRESPONDENCE.

mmunications must bear the signature of the writer, not necessarily for publication.]

APPOINTMENT OF SANITARY INSPECTORS.

ublic officers have their associations. Protection o be the watchword of the times; then, why should Sanitary Inspectors of Great Britain have their The schoolmasters are, by agitation through in, becoming a strong body; and I do not think l be left behind.

fore ask you kindly to allow the columns of your paper (our organ) to be open for a discussion upon le of appointment and tenure of office of Sanitary s'. I do not intend now to enter into a long t simply to ask you to kindly invite the opinion upon the question, and to urge my brother make known that you will receive and publish on the matter.

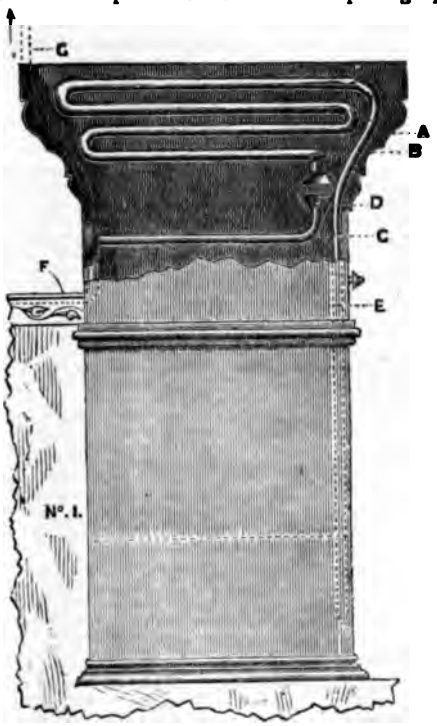
CUI BONO.

all be glad to receive communications and dison this subject.—ED.]

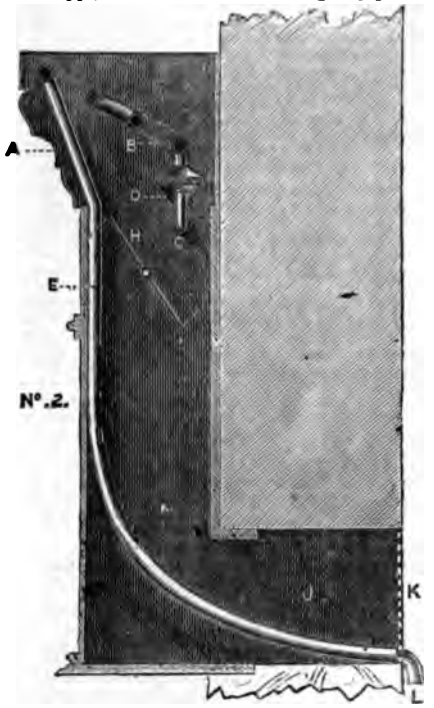
SANITARY INVENTIONS.

S IMPROVED METHOD OF WARMING FRESH AIR.

. Robert Boyle and Son, ventilating engineers, Holborn Viaduct, are the inventors of a simple nious arrangement for warming the supply of admitted into rooms and public buildings. It of a miniature coil of pipes placed in the upper vertical tube, as shown in diagram. No. 1A is the top of the tube, made of iron or zinc, to render it fireproof; B, the coil; C, an air burner; D, shield, perforated at the bottom to prevent the current of air passing up the



tube affecting the flame; E, pipe to carry off the products of combustion; F, ¾ gas pipe, led from most convenient source to supply air burner; G shows gas pipe brought



down from a bracket. *Diagram* No. 2.—H, regulating valve in tube; J, air hole cut through wall; K, cast-iron grating; L, mouth of pipe for carrying off products of

combustion. Dimensions of air tube, 20 in. by 9 in. by 4½ in. This plan has the advantage of being economical; and with the use of it, in conjunction with the air pump ventilator, Messrs. Boyle guarantee the satisfactory ventilation of any building, without the annoyance of the slightest disagreeable draught.

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will be subjected, if unnecessarily long, to a strict curtailment, however.

1. Is Dampness Legally a Nuisance Injurious to Health?

I am afraid that the gentlemen who wrote the editorial reply (No. 6) in your issue of November misunderstood my query. The case of *G. W. R. v. Bishop* is perfectly familiar to me, but it was certainly not the case I had in my mind. There is a fundamental difference between a dripping bridge and a damp house. M. O. H.

[Our Correspondent may think, and in some sense truly, that there is a 'fundamental difference' between a dripping bridge and a damp house, but if he tries, by the aid of the 'Public Health Act', to get a Court of Law to agree with him, he will very soon obtain judgment with costs against him. There are absolutely no decisions recorded which are available to help him in the matter, and the only way a Court of Law could be induced to condemn a damp house would be where there was involved a breach of contract between a landlord and a newly-arrived tenant as to the condition of a house just hired.]

6. Is a 'Dampness' legally a Nuisance Injurious to Health?

In relation to a query in last month's Sanitary Record under the above heading, I trust you will pardon me for expressing an opinion somewhat in opposition to that contained in your answer. In my opinion, Section 91, Par. 1, and Section 97 Public Health Act, 1875, seem fully to meet the case, as I think no Medical Officer of Health can hesitate to declare (on oath, if necessary) that such conditions as are described by M. O. H. are injurious to health. The case of G. W. R. *v.* Bishop hardly applies, as this (if my memory does not mislead me) was a case of water dripping from a bridge to the roadway below, which, though a nuisance in ordinary language, is not a nuisance as defined by the Public Health Act, 1875, inasmuch as it is not injurious to health, for persons passing under the bridge are only temporarily annoyed by the dripping water, and cannot be said to be injured in health, but when the rooms in which persons have to live and sleep are thus made damp the case is different, and there seems to me no difficulty in declaring that such a condition is injurious to health, and therefore a nuisance under Section 91, Par. 1, the house being 'in such a state as to be a nuisance or injurious to health'. A still greater degree of dampness would bring it, I think, under Section 97, as a house 'unfit for habitation'. I have, in several cases, acted on this opinion, but have not yet met with a case in which it has been contested before the magistrates.

Edgar G. Barnes, M.D.Lond.,
M. O. H. Eye Urban and Hartismere Rural Sanitary Districts.

3. The Ventilation of Rain-water Cisterns.

Will you kindly answer the following questions in your next issue? What are the best and cheapest means of ventilating rain-water cisterns for cottages? I find that in country places, rain-water often smells in the cisterns, whereas in the town it remains quite sweet, although in neither case ventilated. Does soot act as a preservative?

Cambria.

[If the rain-water be simply caught from the roof, and stored in tubs or butts, the cover to such a receptacle need be of wood only, with a space between the top of the butt and the cover, such space being covered with wire to keep out slugs, etc. When the storage of the rain-water is in an underground tank, this tank should be ventilated by a four-inch pipe, away out of reach. The chief polluting agent of rain-water in the country is due to the great quantity of vegetable germs from which cities and towns are far more exempt, and we do not think that soot is a factor for good, or, for the matter of that, for evil either. In many of the largest country houses in Lincolnshire and elsewhere, and in many dairy-farms, the sole water-supply is from the roofs, but in such cases the water is passed through an underground filter, built like a mason's dip-trap, filled with gravel and sand. Even then, however, the rain-water tank itself should be ventilated.]

4. The Sanitary Dictionary.

Will you kindly inform me, when we may expect a continuation of the *Sanitary Dictionary*, which has proved of great use to myself and others engaged in sanitary matters? Sigma.

[A work of this kind must necessarily be an intermittent one, so many hundreds of wood-cuts and concentrated matter requiring a great deal of time for preparation, but the balance of the work will duly appear. It was not, of course, the intention to go through the whole alphabet, but to treat upon subjects which find their range in it, and which have distinct relationships to sanitary science.]

5. Cast-Iron Drain-Pipes.

Do you approve of cast-iron drain-pipes inside houses? Alpha.

[Most decidedly, cast-iron pipes are very proper things to lay down inside the house, and provided that they are coated inside with some approved solution, which shall prevent rusting and scaling, they have always performed admirable work. Several English engineers make use of this kind of pipe, and it is also used largely in America with good results. We see no advantage in making use of them for out-door work, and we cannot say that they possess any great advantage over Standford's pipes, when properly surrounded by concrete, except that they are less liable to fracture during any subsidence of the walls.]

6. The Cleansing of Water-Closets.

Is it not necessary to clean out the inside of closets by brushing them occasionally? Expectans.

[All closets except valve-closets, and all closets made of one piece of earthenware, with front, back, or side outlets, are liable to acquire a blackness, after a short use, and this should be carefully washed away weekly, as it not only offends the eye, but must have some prejudicial effect upon the closet-room when exposed to the air after flushing, or when, unfortunately, the trapoing water, through some fault in the flushing, is sufficient to fill only the trap below.]

NOTICES OF MEETINGS.

SANITARY INSTITUTE OF GREAT BRITAIN.

At a meeting of the Sanitary Institute of Great Britain held on November 24th, Prof. F. S. B. F. De Chaumont, M.D., F.R.S., in the Chair; the Secretary read list of donations to Library since last meeting, and Dr. Benjamin Browning, Mr. A. Roberts of Sydney, and Dr. Robert Smith, were elected Fellows of the Institute. Four Members and Associates were also elected, and four Associates enrolled who had obtained the Certificate of the Institute as Inspectors of Nuisances. Applications were read for ballot at next meeting. The Autumnal Congress and Exhibition is arranged to be held at Newcastle-on-Tyne in 1882.

At the first ordinary meeting of the session, held Wednesday December 7th, Dr. Alfred Carpenter in the chair, the adjudicators Dr. William Farr, F.R.S. and Dr. Richardson, F.R.S. reported that the Wyatt Edgell prize of £200 for an essay on 'The Range of Hereditary Tendencies in Health and Disease' was awarded by them to the essay bearing the motto, 'The subtlety of nature far exceeds the subtlety of reason'. On the sealed envelope accompanying the essay being opened, the chairman announced the author to be Mr. George Gaskoin, of 7, Westbourne Park. The prize will be presented by the Rev. E. Wyatt Edgell at the next ordinary meeting, February 8th. The inaugural address was delivered by Dr. A. Carpenter, Vice-Chairman of Council.

SANITARY JOTTINGS.

Mr. Galsworthy, the late vice-chairman of the Metropolitan Asylums Board, has been elected chairman of that body in the place of the lamented Dr. Brewer. Sir E. Currie takes Mr. Galsworthy's place as vice-chairman.

The Registrar-General's Report for Ceylon for 1880 states that no less than 21.29 per cent. of the deaths in the island during that year were caused by fever, and 24 per cent. of the whole total of deaths from that disease occurred in the North-Western Provinces.

The Public Health Committee of the Corporation of Cork have recommended that a public analyst be appointed at a salary of £100 a year, with a fee of 10/6 for each analysis in excess of £100 made for the Corporation.

Mr. Edwin J. Rawson has received, for the fourth time, the Government Grant for efficient vaccination in the North Bierley Union.

The Port of London Sanitary Committee intend to represent to the Government the urgency of the sewer outfalls being removed further down the river.

A writer in the Berbice *Asylum Journal* on the subject of 'Sewage Removal for Tropical Towns' is in favour of a pail system on the Rochdale method, and its suitability to the condition of British Guiana.

The number of attendances of children at the East-end *crèche* founded nine years ago by Mrs. Hilton, has considerably exceeded 30,000. The number last year was 2,048.

ORIGINAL PAPERS.

'THE SEED-TIME OF HEALTH.'*

By Benjamin Ward Richardson, M.D., LL.D., F.R.S.

The Greeks knew that life ought to be a perpetual feast. They not only knew the fact, they acted up to it. They were equally well aware that a long and perfect life could alone be attained by perfection of life at its opening, in the seed-time of health. To die at that time was, therefore, an offence against natural rule, against reason, against sentiment. The knowledge of such an event was death to the brain, death to the heart. In this seed-time of health the life was to be made, the life that was to be in truth a life worth living. Animals beneath men, that are worthy of going through their appointed time, and of being made both useful and beautiful, must have their seed-time of health. Shall their human masters be less cared for? If the masters are to be mere slaves, yes; and then it were a pity and a danger; for they who have no respect for life and beauty, who drag through existence and grow weary of it, are to be trusted neither with life, beauty, nor fame.

In the history of great truths derived from the Hellenic wise times, there is not one truth so great as this, and not one so completely missed. It is the secret that was lost. In our day we have lost it so severely that it might never have been in existence for ought we seem to care. The key to all we would have, the key to the gates of health and happiness, has been lost as if it had never been found.

In point of health our children in these times, proud as we are of these times, are a reproach. Where is there a healthy child? I have never seen one. I might search through the length and breadth of the island, I could not find one. You may put before me a child in all its innocence. It has done no wrong that it should suffer; it may show to the unskilled mind no trace of disease; and yet I know that if I or any skilled observer were to look into the history of the life in question it cannot be found intrinsically sound. It will have to battle with future dangers sufficient for the soundest to meet; but it is not itself free from dangers other than those that are prospective and avoidable. It is sure to have some inherited failure, and too likely some that will help to increase the independent risks that lie before it.

So our children under five years are expected to die in what may almost be called a definite proportion. He is a fortunate man who, having four children born to him, retains three alive. Later on, for a short time, the danger is reduced; with adolescence it recurs. Again it retreats, but with such failure all along the line, that one-third of the allotted life, the life that would be, were it planted in sound health, is only attained.

And for this we have no shame. There is an assembly of learned men which I sometimes visit, an assembly of earnest men who are bent on understanding to the full these human failures from health. These men spare no pains, and to gain a spark of light will labour like miners in a mine. When last I visited them a puny feeble spark of life was in their presence undergoing their searching yet kindly scrutiny. Except that it cried a little and laughed a little in changing mood, this spark of life might have been considered a pathological specimen, and in truth it was discussed as such. No one there had a thought of that small life developing into wholesome life and passing through its natural term; not one was there who did not know that the chances of bare life were impossible, and that nothing could be done to save it. The intent was to study the pathology and fix that by name. They said, when their technical language was translated, 'this child is suffering from the error, some would say the sin, of its parents.' How deep did this error go? In what strange forms did it appear? How singular that the nervous system, once impressed with the poison of that error, should impress another nervous system, and so modify the nutrition of the organism to which it belonged as to cause false nutrition of internal organs and of the very bones themselves! In a whisper one of the learned expressed to another one the pity 'that such a specimen of humanity should ever have been born, to breathe and take notice, and smile, and cry, and love, and suffer, and die, and we be able to do nothing for it except hope for the relief that should end in the earliest death.'

I belong to a committee which takes under its care another class of sad childhood. The members of this community pass before us deaf and mute. We try to give them the powers of intelligent converse by laborious and artificial means, and we do some good; but the train of sufferers passes by, and we know that full half are mute from the undeveloped brain; that they are practically lost to life. It is not that the one sense is lost, and thereby the means of expression by intelligible language; it is not even that the nervous organisation which ministers to intelligence is low; it is that these deficiencies are some of the outward signs of a general deterioration of body, and that there is scarcely a structure which the eye of science would recognise as moulded in health.

Passing from the sphere of general observation, from modified to destroyed vitality, I find more startling effects at hand. A short essay reached me not long ago in which the writer epitomises the facts he has collected respecting the attainment of maturity in peoples of different nations. He tells us that of ten children born in Norway a little over seven reach their twentieth year; that in England and in the United States of America somewhat less than seven reach that stage; that in France only five reach it; and in Ireland less than five. He tells us that in Norway out of ten thousand born rather more than one out of three reaches the age of seventy; in England one out of four; in the United States, if both sexes be computed, less than one out of four; in France, less than one out of eight; and in Ireland less than one out of eleven. And he adds this significant computation, based on what may be called the commercial view of the vital question. 'In producing dead machinery the cost of all that is broken in the making is charged to the cost of that which is completed. If we estimate by this same rule the cost of rearing children to manhood, if we calculate up the number of years lived by those who fell, with the years of those who passed successfully to manhood, there would be found between the two extremes presented in Norway and Ireland,—both, be it observed unnatural,—a loss of one hundred and twenty per cent. greater in the first year of life, seventy-five per cent. greater in the first four years of life, and one hundred and twenty per cent. greater in the years between the fifth and the twentieth, in Ireland than in Norway. In Norway the average length of

* Abstract of an Address delivered at the Brighton Health Congress, 1881.

life of the effective population is thirty-nine and rather more than a half years; in England, thirty-five and a half years; in France, not quite thirty-three years; and in Ireland not quite twenty-nine years. Thus, again comparing the best with the worst of a scale of vitality in which both are bad, in Norway the proportion of the population that reaches twenty survives nearly forty years, or four-fifths of the effective period, to contribute to the wealth of the community; while in Ireland the same proportion survives less than twenty-nine years, or considerably under three-fifths of the effective period.

When we speak of families that lie within our cognizance, we estimate the happiness of the families by the health they represent. If one out of every two of the offspring of the house have died, if some who have not died are mute to the world or otherwise stricken, we soon fall into a thoughtful mood, and say that this home is not a possible home for happy life. Pleasures there may be, happiness there cannot be.

What is true of family circles is equally true of nations. Rest, quiet of nations, repose for cultivation of refined arts and sciences, happiness derived from healthy and vigorous minds and intended for healthy, vigorous, and wholesome purposes, there cannot be, when one or two of life can only reach maturity with a survival of three-fifths of effective population. In such a national family there is persistent mourning. State physicians tender their remedies for such families of nations and call themselves curers, as if that could be cured which is Nature pursuing her merciless course towards her merciful dispensations, in correction of those who have outraged her.

I have named this discourse "The Seed-time of Health," and in the sentences foregone I have tried to strike a contrast, and thereby to give to sanitation a broader meaning as a practical science than is commonly connected with it as a system of details respecting ventilations, sewer traps, and the like.

I want to point to health as the all-in-all to man; the gate of health, leading to the truly good in politics, art, science, letters,—aye, and religion, not less than the least of everything. The strain of my argument is, that, unless we make the early life of our children a seed-time of health,—unless we, from the root of life, so change the conditions which now exist,—all our other measures are practically valueless.

At this moment we have not, as a nation, got this notion set in our minds in such degree as even to accept it, basic as it is, as worthy of serious thought. We have no shame when our young fail and die. Grief we have, fond memories we have; but shame, none. We bury our young as if the act were natural, and erect memorials of it. We read obituaries of the young dead; we read the terrible obituaries of the Registrars-General; we discuss in Congresses like these the cost of young life; but the shame of the Greek touches us not. The knowledge of the troubles which flow from the lack of the shame reaches us not.

We sanitarians are, however, only bound to treat of that which belongs to our own labours, and acknowledging the perils incident to early life, and it may be even recognising the shame of them, have before us the question of their prevention from its health side alone.

That we may approach this task with intelligence, let us for a short time glance at the nature of the perils which beset the spring-tide of human life, and the period bounded by maturity.

The perils are of four kinds:—1. Those that are inherited; 2. Those that are accidental; 3. Those that are inflicted; 4. Those that are acquired.

Inherited Perils.—Foremost amongst the perils to life, in all its stages, but especially in its early stages, are the inherited. We may safely say that no one is born free from taint of disease, and we may almost say with equal certainty, that there is no definable disease that does not admit of being called hereditary, unless it be accidentally produced. To what is known as specific disease, the disease of diseases; to struma, or scrofula, and its ally, if not the same, tubercular affection; to cancer; to rheumatism and gout; and to alcoholic degeneration, the grand perils of life are mainly due. These are the bases of so many diseases which bear different names; these so modify diseases, which may in themselves be distinct, that if they were removed the danger would be reduced to a minimum. These diseased conditions do not, however, exhaust the list of fatal common inheritances. On many occasions, for several years past, I have observed, and maintained the observation, that some diseases, which are to be noticed in a coming page, as communicable, infectious, or contagious, are also classifiable under this head. I am satisfied that quinsey, diphtheria, scarlet fever, and even what is called drain fever, typhoid, are often of hereditary character. I have known a family in which four members have suffered from diphtheria, a parent having had the same affection, and probably a grand-parent. I have known a family in which five members have, at various periods, suffered from typhoid, a parent and a grand-parent having been subject to the same disease. I have known a family in which quinsey has been the marked family characteristic for four generations. These persons have been the sufferers from the diseases named, without any obvious contraction of the diseases, and without having any companions in their sufferings. They were, in fact, predisposed to produce the poisons of the diseases in their own bodies, as the cobra is to produce the poisonous secretion which in its case is a part of its natural organisation.

Accidental Perils.—Next amongst the perils which beset the early life are the accidental dangers to which it is exposed. I do not mean by this the mere physical accidents, the troubles and blows to which childhood is subjected. Not these alone, but the more subtle accidents which are incurred through exposure to vicissitudes of season, and to the influence of those particles of the communicable diseases, which, being introduced into the body, incubate there, and transform the secretions of the body into poisons like unto themselves. A long list of diseases incident to the spring-time of life is found in these two classes of causes of diseases, those due to the contagious particles, numbering from twenty-five to thirty alone.

The grand mortality of the child period is indeed due to the two classes of causes now under our consideration. From exposure to the vicissitudes of season comes, foremost of all, that first step into so wide a universe of evil, the common cold, or catarrh. Upon that comes the continuous visitation which extending to the pulmonary surface, causes bronchitis, croup, pneumonia, tubercular inflammation; or, extending to the mucous surface of the intestines causes irritation there, diarrhœa and choleraic affection. From exposure, again, to the poisons of communicable diseases, there are produced the sad and fatal calendars of diseases of shortest incubus

like cholera; of short incubation, like scarlet fever, diphtheria, erysipelas, influenza, whooping-cough, and croup; of medium incubation, like relapsing fever and cow-pox; of long incubation, like small-pox, chicken-pox, measles, German measles, typhus, typhoid, mumps, and malarial fever; and of longest incubation, like hydrophobia. The returns of the Registrar-General will show, weekly, how in persistent procession these diseases march through the land.

Inflicted Perils.—Third amongst the perils incident to the early life are those inflicted by reason of ignorance, or false knowledge and practice, or hard necessity, or all combined. These perils begin with the earliest days of infancy and continue onward. The tight swathing band in which the helpless infant is enrolled, as if it were an Egyptian mummy; the frequent error that is made in depriving it of its natural food, its mother's milk, and in substituting for that true standard of food, foods having no proper arrangement nor proper assimilable quality; the too hasty introduction to it of foods in common use in adult life; the not uncommon introduction even of stimulants to these young; the imperfect feeding of the mother, and pampering her with stimulants when she undertakes the maternal duty of being nurse to her own child; the poisonous method of giving soothing or narcotic quieteners to children; the almost as injurious plan of taking up children from their gentle life-giving sleeps and exposing them to shocks, surprises, and excitements, that are injurious to every function of nutrition and of mental repose; the confinement of the child in close rooms, away from the fresh midday air; the evil plan of taking it out into the night air and into crowds and noisy places, like the railway-station or busy thoroughfare; the worse plan still, of scolding, frightening, and even slapping, the helpless thing, and thereby implanting in it a nervous, irritable nature which it will never lose. These are the truly crying evils, which in earliest, dreamiest, and most eventful days and months of human life, plant imperceptibly their accursed stings into every day of life that is to follow.

These evils inflicted on childhood in its first estate are, moreover, followed later on by other evils not less reprehensible, and by one worse than all, I mean the evil of endeavouring, during the time when all the nervous force the growing frame demands is barely sufficient to sustain the natural wants of nutrition, to tax that growing frame beyond the powers that belong to maturity, with competitive mental and physical labours. Both good in their way in moderate form, both necessary for health in moderate form, mental and physical labours are, in these days, made the bane of the nation. The false and useless efforts which crumple up the animal and spiritual natures, making distaste for all labour an early disease, and blighting every flower of genius so soon as it begins to bud, is equal in falsity only with the conviction it engenders, that men and women are made but to learn up to the time of maturity, and that an education which is not what is called "finished" when the school or college is left behind, is an education that can never be made up in after life. I know nothing so deathly to mind and body as this anxiety, now all but national in its acceptance, to complete education within twenty-one years, when the fact really is that length of life, and length of happy life, depend on the continued cultivation of mental and physical existence beyond all else.

And still to this grand evil inflicted on youth there is a supplemental evil which adds physical to mental scathing, viz., the commission of corporeal punishment on the helpless young before they know why that is wrong for which they are punished, and often when no wise man or woman could detect any wrong in any part of the savage performance save the wrong done by the one who punishes. To me, as a physician, nothing is more tainted with iniquitous injury than that corporeal punishment of children which proceeds to teach what is believed to be wrong by the instant infliction of physical pain.

Acquired Perils.—The perils acquired by the young themselves, acquired as a rule from imitation of the habits of their seniors, form a last part of the the dangers incident to this seed-time. In boys, late hours, smoking, resort to the use of stimulants, indulgence in games of chance, and self-infliction of early worry, are special acts ruinous to the foundation of a long and healthy life. In girls, the passion for unhealthy systems of clothing; for compression of the too yielding chest in tight unyielding band and corset; the carelessness about clothing in cold weather; the desire to appear in late evening assembly; the recklessness about food and regularity of meals; the neglect of exercise, and the too frequent fondness of affectation in regard to good common-sense rules of manner and life, are, in their way, as mischievous as the errors committed by the juvenile male community, and in some respects lead more immediately to serious consequences.

I will here give a contrast of good and evil, of health and disease under human direction, and, I may say, under human control. There were, some years ago, two communities existing at one time, and noted by an able observer. One community was at Montreux, a parish in the Canton of the Vaud, in Switzerland, a parish of two thousand eight hundred and thirty-three souls. The pastor, M. Bridel, kept a life-history of his charge, and during a long series of years recorded births at the rate of one in forty-five, and deaths one in sixty-four annually, a death-rate of 15.62 in the thousand. The other community was a Russo-Greek, existing at the same period of time. In this community the births were one in seventeen, the deaths one in twenty-five, or at a rate of forty in the thousand. In the Switzer parish one sixty-fourth died per year; in the Russian, one twenty-fifth, or more than twice as many. In Montreux four-fifths of those born reached twenty years; in the Russian class, six hundred and six out of one thousand perished ere they had attained their fifteenth year, the nuptial garments of the mothers becoming, as it was said, the shrouds of the first-born. In the Swiss community the march of life, seemingly slow, was towards health and an improving life; in the Russian the march of life, seemingly so fruitful, if it had been calculated by the birth-rate alone, was the most fatal in Europe.

I would not, for my part, set up this Swiss parish as perfect—far from it; it was but half perfect. Still, the contrast is before us. Why did it exist? The answer was clear. The Swiss success was due to simple forethought and the virtue of continence. Those civilised peasants of the Vaud conserved their health, their happiness, their life, by the comparative slowness and circumspection with which their successive races were brought upon the scene of the world. Those uncivilised Russian-Greeks, reckless as to birth—not much more reckless than some great English towns have been in our time—lost their health, their happiness, their life, by their mad growth of life. With them death was the shadow of birth, and they had no shame. In our present

day, in our best communities, though the reason for the shame is less than it was, yet still it is double in the seed-time of health, what it ought to be, or what it need to be. That the reason for it diminishes is proof enough that it may diminish more; nay, may become refined to the delicacy of susceptibility of those Greeks who dared not let the sun behold their young dead.

How towards this perfection shall we wend our course?

We have seen that, in the seed-time of youth, there are four influences at work, sustaining the perils that bring the cause of shame. It is by carefully and earnestly correcting these that our course shall be towards success and honourable vitality.

To those *inherited* perils of which I have spoken our minds must first be turned.

I know, and it is hopefullest knowledge, that I shall be listened to by thousands with attention and respect when I urge that, in regard to these inherited perils, wise men and wise women will soon begin to think, even in relation to the marriage tie, before they of a certainty inflict those perils on the world. And with this hesitation such good will come as I dare not express. Let it be known that there are certain marriages which must lead to intermarriages of disease of body or mind; let it be known that results of combinations of this kind are inevitable towards premature death; let it be known that results of combinations of this kind are as inevitable towards sickness and death as combinations of health are inevitable towards health and long life, and we cannot but feel sure that no perversity of folly can long continue to produce through birth the most fatal types of all fatalities. Let hereditary death be once recognised as an element of the marriage contract, and the health and life of the nation will receive a lease that shall double the value of one and the duration of the other. I speak on this point not from simple enthusiastic hope, but, happily, from a knowledge singularly cheering. A short chapter of mine in 'Diseases of Modern Life', entitled 'The Intermarriage of Disease', has itself during the last six years been the means of checking many of what would have been most deplorable instances of these intermarriages.

While this reform lingers we have some direct means in our hands for lessening the extent of even propagated perils. By beginning early in life to place those who are born to peril in conditions for good life, it is astonishing how much can be practically done for them in their bad if not in their worst estate. Take as an example of this reforming service the Anerley Schools, where waifs and strays of society, born to all kinds of physical perils, are tended and trained in mental and physical arts. It is like a regeneration. The bloodless, the scrofulous, the rachitic, the rheumatic, predisposed by birth to these afflictions, burst out into such active life that the diatheses seem in abeyance.

In this cause and course the schoolmaster becomes the physician, and the more we have of this branch of the healing faculty the better for us all.

In the removal of the diseases by inheritance there are, then, two modes of treatment, the preventive and curative; preventive in wisdom of selection of parentage; curative in training those whom no prevention has blessed, into the choicest conditions for health in the seed-time of health.

There is yet another removable cause of these perils which I dare not, though I touch it with lightest finger, omit. It is indicated on the chart of sin and shame in dark, black, pall-like blot. It is the physical crime which men and women commit when in days of responsible life they acquire to themselves, by intemperance and other terrible indulgences, those inheritances of crime which pass to their children and proclaim their shame through them. If we could take the world, drowsy in ignorant lusts, and shake it into knowledge here, what crime and shame were saved in one generation, none can tell.

The accidental perils which beset the young in the seed-time of health, and which we accept as evils which sanitarians are bound specially to combat; those serious perils which spring from the exposure of the body to the poisonous particles which produce disease by contagion or infection, come next before us for removal. We call these perils contagious diseases; we know the number of these diseases, we know that their number is limited, that it is confined to thirty at the most, and practically to little over half thirty. We know that the members of this class of diseases have different periods of incubation, that is to say, of period intervening between the reception of the poison and the development of the symptoms produced by the poison. We know that the symptoms of the diseases, once developed, run a regular course. We know that some persons are more susceptible to them than others. We know, that, to a certain extent, one attack of suffering from many of the diseases is a cause of exemption from future attack. We know that the diseases assume an epidemic or spreading character, and that each of them has its season in which its spread is so remarkable that its general course may be charted or outlined as connected with the time of weeks or months or years. And if, regarding the nature of the poisons which produce the diseases, we know least and are most divided, we have, at all events, this precious knowledge, that the poisons themselves are removable and destructible, so that they lie within the range of human control.

What is more, we have the clearest demonstration that while the poisons of these diseases can be generated, cultivated, and disseminated, when the conditions for such generation, cultivation, and dissemination are present, they can also be prevented to such an extent that places which were their favoured homes can be made the places in which they cannot live.

When you enter a court of justice, to this day, in some old country assize town, you see lying before my Lord Judge a bunch of rue. That bunch of rue was once, not very long ago, the supposed antiseptic or purifier which interposed between my Lord Judge's nose and the fever-stricken prisoners at the bar before him. Once, not very long ago, the gaols from whence those prisoners were brought were the centres of the great pestilent disease, typhus. The men, stived up in those horrid dens, fed with air charged with their own emanations, and fed with food on which they starved, generated the contagion of disease. The gaols then were the foci of fever. But a change took place. Howard, who was as good a sanitarian as he was a philanthropist, and whose rules for the construction of sick hospitals remain model rules to this hour, proclaimed his mission. The gaols began to improve; one improvement of a sanitary kind followed upon another improvement; the results began to arrest attention, and the good that was being done increased and increased with every year. The triumphant result is that in the gaols, the foci once of disease of the spreading kind and of worst types, spreading diseases cannot practically exist at all. We might lay roses before my

Lord to-day instead of rue, or lay the rue on the dock instead of the bench, for the prisoner, in matter of risk from contagion, is actually safer than his judge.

I cannot overstate this lesson. If the homes of those who live in the seed-time of health; if the nursery, the schoolroom, the school dormitory, the playground, were only kept in the same state of physical purity as the model prison, the perils from the accidental diseases caused by infectious particles of diseases were soon removed, and the *immortelles* we see on the little graves so thickly laid in cemetery and churchyard were as little called for as the rue on my Lord's dais.

By a few rules, in short, which all prudent and wise people may carry out in their own homes, the accidental perils of the seed-time may be kept from the homestead as easily as from the prison house. Let every man and wife be their own sanitarians and make their house a centre of sanitation. Let in the sun; keep out the damp; separate the house from the earth beneath; connect the house with the air above; once, nay twice, a year hold the Jewish Passover, and allow no leaven of disease to remain in any corner or crevice; let the house cleanse itself of all impurities as they are produced; eat no unclean thing; come back to the first-fruits of the earth for food; drink no impure drink; wear no impure clothing; do no impure act; and all the good that science can render you is at your absolute command.

The perils incident to the seed-time of health which I have called *inflicted*, come before us as altogether removable. To remove them skill even is not demanded; nothing is demanded but common human nature and common human sense. That every mother should nurse her own child; that in the early days of life, before the consciousness is naturally developed, the blessed sleep of infancy should be allowed its natural course; that the senses should not be oppressed until they are duly developed; that the quickly breathing lungs should be fed with fresh air; that the yet feeble digestive organs should be supplied with simple food; that the growing body should be clothed in warm and loose garments; these, surely, are practices the simplest people can carry out, practices easier than most which now prevail. Again, that gentleness should be law of treatment to the young, and that the mind should be taught to know before the body is taught to suffer, that, surely, is a practice which all can carry out. Once more, that the growing bodies of our youth of both sexes should be permitted to enjoy the full force of the growing power allotted to them; that such power should be permitted to play its part for their nutrition, so that the body may be endowed with its full maturity; that, surely, is a practice of letting Nature have her free course,—in other words, of letting well alone,—which all can follow much more easily than most practices that now prevail. Lastly, that the growing mind should be permitted its free and natural course to grow and grow throughout the whole term of its earthly life, and not be killed in its early career by the insane pressure of labours it is utterly unable to bear, or to apply if it could bear them; that, surely, is a practice simplest of all, most natural of all, and most certain for the promotion of intellectual and social advancement.

The fourth series of perils incident to the seed-time of health,—those which I have designated the *induced*,—are, like the last, entirely under human command. For them to be removed, however, a reform beginning with those who have passed the seed-time is the absolute necessity. These perils must cease, and can only cease, by the process of the younger learning what is right from the examples of the older and the wiser creations of humanity. While middle-aged and old men and women indulge in low and injurious luxuries and pleasures, which inevitably shorten and embitter existence; while these revel in intemperance, and break every sanitary law in the Decalogue and out of it, it cannot be expected that imitative youth will do less than follow in their staggering and bewildering footsteps. I say nothing but what is good of physical exercise; I would that every school were a gymnasium; I would that every man and woman could ride well, walk well, and skilfully exercise every sense and every limb. I urge only that this example be set, that all exercises, whether of body or mind, be carried out in purest habitude and in accordance with the enlightening progress of the age.

Approaching now the close of my discourse, I find two applications of thought with which briefly to trouble you; one general, the other local and connected with this passing hour. I have tried to bring before you the seed-time of health, the time when this humanity of ours, in body, mind, and spirit, is learning either to live well or to live ill, to live long or to live short according to its life in the seed-time. I have shown how bad is the seed-time, how pressing the shame of it, and how shameless nevertheless. I have tried to show what are the elements of reform which in that seed-time are required. In general expression of thought I would, respectfully as earnestly, ask those who rule and govern us to look at this period of life as it is; to make it their test object of good or bad government; to assure themselves that when the death-roll of this period of life reports itself filling, filled, the government is bad, happiness out of the question; peace, order, national greatness all impossible; that when the death-roll of this period is emptying, is emptied, all is well; that life then promises to run its completed course, and peace, concord, and prosperity to accompany the health that is ensured.

STATISTICAL SOCIETY.—'HOWARD MEDAL ESSAYS.'—The usual Annual Competition for the 'Howard Medal' (1882) will take place subject to the usual Rules and Conditions. The Council have decided to grant the sum of £20 to the writer who may gain the 'Howard Medal' in November 1882. The Essays to be sent in on or before the 30th June 1882. The Subject is—'On the State of the Prisons of England and Wales in the Eighteenth Century, and its influence on the Severity and Spread of Small-pox among the English population at that period. The Essays also to present a comparison of the Mortality by Small-pox among the prison population of England and Wales during the Eighteenth Century, with the mortality from the same cause during the last twenty years.' Further particulars or explanations may be obtained from the Assistant Secretary, at the Office of the Society, King's College Entrance, Strand, W.C., London.

NON-POISONOUS PAINTS.—Persons in search of a non-poisonous paint will be glad to hear that such a desideratum is ready to their hand. The *Plumber and Decorator* states that the principal corridors, out-houses and stables of Marlborough House have been re-decorated by Messrs. Mowlem and Son, the contractors, of Westminster, who have used exclusively Albissima paints for their work, with, we may add, the best results. The same journal adds that the consumption of these non-poisonous paints is very rapidly increasing, and that it has also been applied to the decoration of some of the corridors of the House of Commons, and other public buildings throughout the country.

ON THE PREVENTION OF EPIDEMICS.*

By EDWIN CHADWICK, C.B.

I HAVE been requested to give a paper on the health of towns and on the sanitary legislation affecting them. In relation thereto I begin with an account of one special measure of such legislation, involving the sanitary principles of relief and protection against ordinary epidemics, such as the small-pox; and I believe I may best do this by a narrative of the measures for a defensive campaign undertaken to withstand the invasion of the extraordinary epidemic of Asiatic cholera in 1848-49, which may probably be new to most people at this time. At the first general Board of Health, of which I was the chief executive officer, we had, in 1848, warning of the approach from India of the enemy, and the threat by such infliction of a heavier slaughter by thousands than would be effected by visible enemies of the largest of hostile foreign hosts. Our first council was as to the nature and state of the former established defences.

ORIGINAL DEFENCES BY QUARANTINES. WHY DISCARDED.

Those of the old routine were for the outer defences by strict quarantines, and, when these defences were broken through, of hospitals, and a common treatment of the sick in them—almost of necessity in the later collapsed stages of the disease. We had information of the measurable distances of infection from the specific disease not greater than those of our common epidemics; but, as we showed in a report on quarantines, which was accepted and translated for circulation, the quarantine service as practised on the Continent as a defence, would be as an attempt at shutting out the east wind, and, for reasons which I shall give, utterly feeble and illusory as a defence against cholera.

LOCAL CONDITIONS OF ORDINARY AS WELL AS OF EXTRAORDINARY EPIDEMICS.

Our conclusions on that head have been affirmed by subsequent experience, especially by the vastly quickened international communications, by steam on sea as well as on land, which bring in and distribute everywhere persons in conditions of latent incubation of infectious disease, diffusing everywhere, according to our information, sources of infection that must have aggravated such visitations to an extent never heretofore experienced. I have shown that all the mischievous and false securities against epidemics, of quarantines, and grievous obstructions to international communication will have to be removed. It appeared to me and my colleagues, on examination, that the great impending visitation would probably advance as to places chiefly on the lines, in local conditions, on which ordinary epidemics now proceed. In Poor-Law administration, I had been pressed by medical officers to take business out of its turn, because, from the state of the weather, they had a confident expectation that they would have some visitation of one of the ordinary epidemics to deal with. Asking one of them, the medical officer, what was the specific disease he apprehended, he stated that when he arose in the morning, and found the atmosphere warm, moist, and stagnant, he always found that there would be an increase of some foul-air disease;—it might be typhoid, it might be scarlatina, it might be measles, it might be small-pox, but of one species or another of eruptive disease he was sure to have in such weather in the low-lying and ill-drained districts. I asked a relieving officer of a large district—to test his knowledge of the habitat of such disease—whether, if I gave him some half-dozen cabs, he knew where, without previous knowledge, he could go and fill them to bring fever cases, and he said he could, just as a gamekeeper might go and get a bag of game—he said he certainly could; the cases might not be all of typhus, but fever cases of one sort or another, he knew where he could find them. It appeared that small-pox follows on much the same lines as typhus, and so does scarlatina, but with wider deviations as to classes of cases and conditions of persons. On passing through a low district I observed, 'Surely this must be a fever nest', when out came some children with the marks of recent small-pox upon them. I remember that I was once consulted by Dr. Lyon Playfair as to the readiest mode of making a sanitary inspection of an urban district, without the medical officer's or the Registrar-General's returns, which there was no time to get out. I advised him to go into one of the primary schools, and select a group of the most squalid children, get their addresses, and go there. He told me that he had acted on this suggestion; and that, in the first school, there were two boys with particularly blotched faces, and he had found that their habitations were at the confluence of some putrid sewage. I have indeed myself, on view of the children of different large district schools, made proximate estimates of the comparative death-rates of the districts whence they came; and it is a large and most pregnant fact, attested by experienced teachers, that as the lowest districts have been improved by sanitation, the type of the children received therefrom has been improved. On inquiring as to the course of the Asiatic cholera in its previous visitation, we found that it was very much upon the common fever conditions. It did not visit them all, but such as it did were visited with marked severity. Indeed medical officers of experience in the former visitation foretold in which streets, and on what sides of street, and into what houses it would again come; and their forecast was verified even as to the rooms of particular houses.

VARIED TYPES OF EPIDEMICS IN COMMON CONDITIONS.

The variations of the types of these extraordinary visitations, and their repeated attacks on populations in the like local conditions, and the state of the intelligence which continues those conditions, is a matter of profound interest in sanitation. In the city of York we had one classical instance presented of a particular court, called the Hagworm's Nest (the Hagworm is a species of anguis, infesting [illegible] heaps), which by tradition was the first spot visited by 'black death'; the first by the 'great plague', the first by the 'sweating sickness'; and, as it remained unchanged, inquiry was made whether it was true to its traditions on the visitation of cholera in 1832, and it was so. We have analogies to such variation of the types of epidemic visitations on the like local conditions, in recent times. For example, Dr. John Sutherland, our active sanitary inspector in London, and of the Army Sanitary Commission in the Crimea,

* Delivered at the Brighton Health Congress, Dec. 1881.

Captain Douglas Galton, in their report, as members of the Barrack and Hospital Improvement Commission, on Malta, show that the same localities and houses in Malta which yielded the majority of plague deaths there in 1813, yielded the majority of the deaths in the cholera epidemics of 1839 and 1865; and that in the intervals the same localities yielded the majority of cases of small-pox, fever, and of an anthrax, a very special eruptive epidemic attended by carbuncles. Up to our time, although the occurrence of the epidemics on certain local conditions was noted, the occurrence was taken as a constant, and no steps were thought of or taken to change those conditions.

ALTERATIONS FOR PREVENTION MADE IN THOSE CONDITIONS.

The observation of the experiences had then pointed out to us that the first objective points of defence against the coming attack were the alteration, as far as might be done within the time, of the conditions of the exposed places, the sites of the ordinary foul-air diseases on their epidemic visitations. We sent out instructional notifications to the Boards of Guardians, and the Local Authorities, to put them on the alert against the extraordinary visitation coming. They were inapt and dilatory. We then sent out our sanitary inspectors to examine and report on the particular measures to be taken for the protection of the population in the most exposed districts in the Metropolis. It is to be observed, that action by such authorities at intervals of Board meetings is slow, and that, for prevention, it must be quick, and by skilled and responsible officers. Much was done in the lower districts there and elsewhere by extra activity in surface cleansing. Parish fire-engines were turned out, and courts and alleys were thoroughly washed down by them. For covering the excrement-sodden pavements and surfaces in the close courts, such as urban districts, particularly of the Northern towns paved with bolder stones, we ordered fresh mould to be brought in, and a covering made over them and over dungheaps, some three inches deep, to serve as an earthwork, as it were. The people declared, where this was done, that they felt themselves in new atmospheres such as they never had before. We ordered pigs to be turned out, and the styes to be cleansed. In some of the Scotch towns there was great uproar against this, but our orders were then law, and the pigs were turned out by the thousand, and kept out, until the epidemic had passed. Stagnant ditches were ordered to be drained. But we soon found out, simple as it might appear, the work of ditch-cleansing could not be left with safety to the parish authorities, but must be done under skilled superintendence, as to methods and times, as otherwise the people were apt to spread the putrid contents over the banks, and extend the evaporating surface, so as to generate immediate fever. Stable dung we ordered to be removed, and the stables in mews to be cleansed daily, and one experience I gained was, that by proper arrangements this might be done in ordinary times with little extra expense.

EVIDENCE OF THE CLIMATORIAL CHARACTER OF THE EXTRAORDINARY EPIDEMIC VISITATION.

But there were places which we found to be in conditions of filth that were irretrievably bad. There our only remedy appeared to be, as the epidemic advanced, to tent out the people. We borrowed tents from the army stores in the Tower, and ordered the people to be tented out in them, as at Wolverhampton and other places. One of them, the small fishing town of Mevagissey in Cornwall, presented, when the cholera came, an instructive instance of the climatorial character of the epidemic. People in the tents after some days got tired of bivouacing out, and returned to their dwellings, where they were re-attacked with premonitory symptoms; they returned to their tents, and were freed from them. They again ventured back to their homes, and were again attacked. They returned to the tents, and were freed, and remained there until the epidemic had passed. I was informed that members of the bar of the Northern Circuit, on going to towns where the cholera was advancing, were many of them subject to premonitory attacks, on leaving one town were freed until they got into another affected town, where they were again attacked, and on leaving it were again freed.

During the prevalence of the epidemic, Lord Palmerston sent for me, and told me that the Queen had been invited to return from Scotland in the direction of one of the towns, and asked whether I thought it safe for Her Majesty to do so. I advised certainly not, and I did so from the belief that the epidemic was climatorial, and the information of the fact that passengers staying only for a night in the good hotels of one of the districts had been subject to premonitory attacks.

Instances were noted in India, Russia, and Germany, as characteristic of the epidemics, that birds, such as rooks, disappeared on its advance, and only returned on its departure. Thus, Colonel W. K. Stuart, of the 86th Regiment, in his *Memoirs*, states in relation to the cholera at Burantpore: 'Before proceeding further, I must relate a curious circumstance that occurred, which, in my opinion, establishes beyond doubt the fact that the cholera is atmospheric. Every person who has served in India must be aware of the number of kites, vultures, and other birds of prey that congregate around the cantonments of a regiment. For some days before the first case of cholera broke out, all these birds had disappeared; not one was to be seen, and they never returned until the plague was gone. Where they went to nobody knew, but such was the case. Surely they must have been made conscious by the sense of smell, or by some instinct, that there was danger in remaining in that atmosphere.' It has been held that the cholera is conveyed only by human intercourse; and when it advances itself, in the direction of lines of communication, it may appear to be carried in that way. If there had been any affected persons in the house at Mevagissey, it might have been surmised that the people returning were infected by the persons instead of the places, and in the places being many of them excrement-sodden, the attacks might be ascribed to the alvine secretions, which were probably exciting causes. But troops on the march in India have been attacked on particular open spots, clear of population, and on a change of position, as from one hillside to another, have been freed from attack.

We had neither time nor means to direct the efforts of chemists to ascertain, if they could, what these aerial conditions were. But be those conditions what they might, they appeared to traverse districts in particular directions. In India there appears to be a cholera law on the subject. Thus cholera is moving along a certain line to the north-west. In the rural districts the people are sedentary, and they scarcely ever move from home. But on-

ward moves the epidemic. At last it arrives on the borders of the desert, where there are no people, and no intercourse, no alvine secretions, and no sewers, yet the statistician sitting in Calcutta can tell almost the day in which the epidemic influence will have crossed the desert. On such facts there appears to be as little ground for speaking of the importation of the infection of cholera by persons, as there would be of the importation of the 'infections of skin eruptions', which we know are attendant on the advent of the east winds.

EPIDEMICS INFECTIOUS THOUGH CLIMATORIAL.

I may here state, that although the evidence points to the fact of these large epidemics occurring at long intervals being chiefly climatorial, or affecting particular areas, they may yet be, and, as in the case of the small-pox, they largely are communicable by infection. Permit me to illustrate this by a story told of Beau Brummel: a friend met him with his throat muffled up, and asked what was the matter with him, when Brummel answered that it was owing to that rascal Tom his servant having put him in the same room with a damp stranger! Now a damp stranger might have done this to a highly sensitive person. But a crowd of damp strangers in a room might be really additionally dangerous, although the cause was climatorial, and due to the outside storm which made them damp. When an ordinary epidemic advances, is it ever observed, that there has been no extraordinary corresponding movement of persons, or of society preceding it? We directed an examination of the cholera advance in the Metropolis, and found it did not advance in succession, case after case, but nearly simultaneously in widely scattered instances between which it was impossible to prove communication. By the various means I have recited, we got the local defences more extensively prepared than might have been expected, considering the very inadequate central staff we had at our disposal, and the weak local staff. We were greatly aided by reasoned notifications on which we derived great aid—from the clergy, and persons of education.

But we could not cover all points of defence effectively. There were obviously weak lines through which we must expect that the coming epidemic would break, and we must provide for a greater or less number of sick and wounded. For them the provision of hospital accommodation was heretofore usual and general, and the exclusive system. On this topic we made anxious enquiry. We sent for all the practitioners we could get together, who had been in the thick of previous visitations, and consulted their experiences as to what did do and what did not do in cholera.

WHY LARGE HOSPITALS' TREATMENT ABANDONED.

From them we gathered this experience; that, in the stages of collapse of the disease, the mere act of lifting up the patients from their beds to remove them frequently killed them; also that conveyance over rough roads in common cabs, or even in litters, delivered many dead at the hospital. In the hospitals, moreover, the mortality, under every form of treatment, was excessive. On the whole, with all defects of their homes, and the difficulties of medical appliances in them, it were better to let them remain there than to remove them. The evidence in support of this conclusion was so strong that we were led as a general rule to dispense with the provision for special, or even general, hospitals. We had then to resort to provisions for home treatment. At this time we made what was really, as regarded all antecedent treatment, a discovery.

DISCOVERY OF PREMONITORY SYMPTOMS OF THE EXTRAORDINARY EPIDEMICS.

Through my friend Mr. Hodgson, of the College of Surgeons, we learned that a Doctor McCann, of Bilston, had made much observation of the previous course of the disease, and had ascertained that it had generally premonitory symptoms of slight diarrhœa, with rice water purgings, and that in that stage, if taken in time, it was amenable to regimen and medical treatment. This general fact was established upon the widest information we could collect. We, upon this, consulted the curative authorities, the College of Physicians, and obtained from them the sanction of medical treatment by opiate confection.

HOME TREATMENT OF THE PREMONITORY SYMPTOMS.

With this we inaugurated a general system of house-to-house visitation, to inquire as to each person in the family, whether he had experienced any premonitory symptoms, or observed rice water evacuations, and, if so, to give the medicines provided in packages; and to accompany such exhibition with instructions as to precautions in the regimen due to a weakened stomach. There was at first great difficulty in finding properly qualified house-to-house visitors, and getting them into action. Then it was that we had experience of the evils of the default of the local administrative organisation, against which I had from the first remonstrated, and which has yet to be removed for the effectual reduction of the ordinary epidemics—the evils, *e.g.*, of allowing the public health service to be combined with the private practice. For at this time, when there was the greatest pressure for the public service, there was the conflict of the preponderant private interest in the greatest pressure upon the officer for his service to his private patients. We got the local deficiencies from this cause supplied as well as we could in the time, though it was with great inconvenience and often with loss. On the whole, the house-to-house visitation and home treatment was eminently successful in meeting the extraordinary epidemic, and it commends itself for adoption decidedly in dealing with ordinary epidemics. By it in this epidemic errors in regimen were most easily overcome. An effect of the visitation reported as observable in various districts, the causes of which passed without examination, was to depress vitality, to make it as if the people were made old and weakly by it, and to make irregularities and all errors in diet, which in ordinary times had been heretofore incurred with impunity, at this time particularly injurious. It appeared as if some of the common sources of water-supply had been injuriously affected by a passing cause; so much did this appear to be the case in some of the rural districts as to create a suspicion in the minds of the people that their wells had been poisoned.

ORDINARY COURSE OF THE ATTACK OF THE EPIDEMIC.

The common course of the attack of the epidemic on a place undefended by any organisation was that it began with a large proportion of deaths to the attacks; one half, even, fell, then one out of three; as it spread widely the proportion of deaths diminished to one out of four, of five, and of six, and so it went on until the epidemic was exhausted. Its rise was represented by a curve, like a mountain; the curve then gradually fell in number and in the

proportion of attacks, until the epidemic disappeared. At the first onset of the epidemic, no treatment appeared to succeed; as the epidemic spread, and the force of the attack weakened, and became utterly reduced, then almost every sort of medical treatment appeared to succeed, or had the credit of succeeding. By the defensive course taken, of the reduction of the local aerial impurity by the cleansing of places, the number of the attacks was reduced; by the house-to-house visitation, and the dietetic and medical treatment, the proportions of the deaths to the attacks were immediately and decidedly reduced. So clearly was this the case, that if from the daily returns to one central office from any place it appeared that the proportions of deaths to the attacks were not reduced,—if the proportion of attacks still went on,—we were clearly of opinion that there must be some default, and that the house-to-house visitation must have been interrupted, or not carried out. In one large place the house-to-house visitation had been arranged and brought into operation, with the proper results. Suddenly the proportion of deaths to the attacks, and the attacks, rose again. It was evident to me, at the Central Board, that the house-to-house visitation was interrupted. One of our most efficient assistant-commissioners was telegraphed for and sent to the spot, where it was found, as apprehended, that, from some dispute amongst the local authorities, the house-to-house visitation had been stopped. Matters were arranged, the practice was restored, and carried on properly, when the proportions of the attacks, and of the deaths to the attacks, were again reduced, until they entirely ceased.

GENERAL RESULTS OF THE COURSE OF DEALING WITH THE EPIDEMIC, BY ALTERING THE LOCAL CONDITIONS AND BY HOME TREATMENT.

On a view of the results of this same great epidemic visitation of the cholera in continental countries, where it was met in the old way chiefly by reliance for defence on quarantines, and then, when it got in, on *impromptu* hospital accommodation, with general treatment necessarily chiefly in the collapsed stages, and a comparison with the results of the treatment we adopted of the removal, as much as possible, of the predisposing local causes, as by cleansing the places, and then of a house-to-house visitation and home treatment in the earliest stages, the place of a general hospital treatment, it was evident that we obtained a gain of full two-thirds by our defensive course. Comparing the rate of mortality with that which prevailed in Sweden, where the ordinary death-rate was then lower than in Great Britain, and where our precautions and the home treatment were not taken, it appeared that we might claim to have saved some fifty-thousand lives. But Professor Zedkauer, consulting physician to the Emperor of Russia, supplies decisive testimony of demonstrative facts on the point in a letter written to the last Medical Congress at Brussels. In that letter he says that 'to England is due the honour of having introduced on a large scale measures (*prophylaxques*) against the contagion of cholera.' He states that during the cholera epidemics of 1830, 1848, and 1855, there were not less than from 23,000 to 25,000 deaths, or from 47,000 to 50,000 attacked with cholera in St. Petersburg, but that in 1866, when they became acquainted with our practice of the house-to-house visitation and followed it, out of 15,000 attacks they had only 3,000 deaths. On an independent examination of the work for the attainment of the end described, I think it would be evident that if there had been any other than the ordinary distracted political attention prevailing at the Government; had there been a Minister of Health, such as it is now agreed that a State organisation requires, with a superior responsibility and interest in observing the beneficial working of the temporary administrative power confided to us—if it had been duly observed how large an amount of sickness and death was saved by the exercise of that power during so short a time, it may be submitted that there would have been an anxiety to make the authority permanent, to strengthen it, by due public acknowledgment of the service rendered, and to extend it. But when the extraordinary epidemic disappeared, the special organisation—the powers of prevention—were allowed to lapse.

INJURY TO THE PUBLIC BY THE CHANGE OF THE FIRST SANITARY AUTHORITY.

Some time after, the first Board which had achieved the result was discontinued; and its discontinuance was received abroad as a shock and injustice, and was publicly expressed as such by the chief sanitary authority of France. The uninstructed, unaided, and lax local administration reappeared, and with it the causes of the foul-air diseases, and also the ordinary epidemic diseases which now cost some hundred thousand of the preventible deaths throughout the kingdom, the extent of such accommodation for which provision is now in question. The visitation of the cholera in 1848-9, which the first general Board of Health dealt with, reappeared in 1854, and had to be dealt with by the department, under the presidency of a political chief. Most beneficial examples had been achieved by the almost entire clearance of the common lodging-houses from the ordinary epidemics, by the application of the principles developed by the first General Board under Lord Shaftesbury's Act, and by the model lodging-houses, chiefly by house drainage, ventilation, and the prevention of overcrowding, initiated by the Prince Consort, where the death-rates of the class-occupants have been reduced nearly one half. But these examples cited in the general report, made for the new president by Dr. John Sutherland, our chief sanitary inspector, had yielded little imitation. It was found, on renewed local examination by the officers of the Board in the Metropolis, that the local conditions of filth, and of the ordinary epidemic diseases, had reappeared, together with those ordinary epidemics. I may mention, as respects London, that our Board had elaborated a plan for placing the water-supply of the metropolis under unity of management on a public footing, such as we had effected in a number of provincial towns, involving the adoption of the constant supplies, and the abolition of stagnation in cisterns which make good supplies bad and bad supplies worse.

FRUSTRATION OF MEASURES PROPOSED THAT MUST BE RENEWED IN THE METROPOLIS.

In the report made by a new inspector, Dr. Hassall, on the second reappearance of the Asiatic cholera, he is struck with the continuance of this evil condition, and he says, 'I beg to express my conviction that the water-supply of the Metropolis will never be in a satisfactory condition until the use of cisterns is abandoned, and the constant method of supply adopted.'

INCREASED CHARGES INCURRED BY NONFEASANCE IN THE METROPOLIS.

But through the greater part of the Metropolis this vicious system is continued up to this time (1881), together with the waste of more than three-fifths of the water pumped in, which is fouled water, saturates the excrement-sodden sites with a quantity of fouled water, equal to a double rainfall, the results of which are shown in the supersaturated lower levels by double attacks of the ordinary epidemics. But this continuance of the old evils as respects the water-supply is accompanied by augmented charges, sanctioned by Parliament, for double and threefold separate works, for the separate trading companies that would have been unnecessary under the unity projected on a public footing, which unity has since continued to be reinforced, as a necessity, by commission after commission. Plans had been got out, based on trial works, and experiences obtained of buildings for carrying out all the fouled water by self-cleansing house drains, and this would have been accomplished, as was proved by experiences in block buildings within the expenses incurred for amending and maintaining the old drains of deposit, or at about a third of the expense that must now be incurred by the individual householder who drains his house separately, even under one of the effective Sanitary Defence Associations that are now being usefully promoted. For the reception of the fouled water were provided chiefly tubular sewers, which by their ordinary dry weather flow were proved to be self-cleansing and to need no flushing. For the lower districts a concentrated flow and a quick discharge by engine power from pumps was prepared. For the relief of the low-lying marsh districts, which are a great source of the fogs of the Metropolis, a separate system was in preparation on the principle of the successful drainage of the fen districts of Lincolnshire. From the results of the rudimentary applications of the sanitary principles executed in some twenty towns, as at Croydon, where the whole of the fouled water is out of the houses and of the town on the land in some two hours, there can be no doubt that all the matter of putrefaction which now remains in ill-drained houses and the sewers of deposit for months and years would have been removed from the Metropolis within half a day, with the result obtained in those several instances quoted, of a reduction of the general sickness and death-rate by at least one-third.

DISUNITY OF WORKS MAINTAINED WHERE UNITY NECESSARY FOR EFFICIENCY AND ECONOMY IN THE METROPOLIS.

But to effect this, entire unity over the whole metropolis was essential for the combination to be effected by very special science. It would be too long, and beside the present purpose, to state how the sanitary authority which had prepared this was set aside by a surprise-vote against the Government, by combined adverse interests at a morning sitting, and how the succeeding political President of the Board brought in a 'Bill' for the government of Metropolitan works, by which all the requisite unity was destroyed; with the entire omission of the essential part of the system—the house drainage; and a bill was passed to effect the disunity by placing the trunk lines of the sewers under one authority and the branch lines under thirty-six others, and those others, of all authorities for dealing with a scientific work, the vestries! Under such rule the old conditions of the ordinary epidemics are maintained. On a recent examination of some mile of trunk sewer, which was a foot deep with putrid deposit, a line giving off fever into the public offices was discovered, which, combined with bad house drainage and the foul sewage of the rest of the district, recently occasioned the loss of Dean Stanley.

HONOUR ERRONEOUSLY AWARDED FOR MALFEASANCE.

It is not unfair to observe that the President who, left to our officers and the partial use of our measures, without the increased experience that would have been available for the task of meeting the second extraordinary visitation of the cholera in 1854, and who brought in the measure which I have described as effecting the egregious subsisting disunity of works which, if the condition of the Metropolis is to be ever retrieved, must be certainly set aside, claimed, and was accorded, a peerage for that work, the mischief of which neither he nor the Government could have understood in the retention of lines, really of epidemic, neither he nor the Government could have known, and that all will have to be superseded by the system of unity and circulation for the more expensive as well as more mischievous one, now prevalent, of disunity and stagnation. By the change brought about at the Central Department, officers who had done the most meritorious preventive work, calling for acknowledgment, were put under a cloud, as it were, as if they had been doing something bad, only excusable by defaults of their instructions. In the Metropolis the works were given over chiefly to railway engineers, who had nowhere done sanitary work or reduced a death-rate by a percentage. The first objective point for sanitation was the purification of the river by intercepting sewers, made great to receive, with the sewage, extraordinary storm water. Those works are pronounced to be great blunders, accumulating deposit, and acting as extended cesspools, giving off, like the one I have described, noxious products of decomposition. The expense of these trunk lines of intercepting sewers would, it is now shown, have sufficed for the re-drainage of every street, court, and alley in the Metropolis, with self-cleansing sewers, and also to have re-drained the worst of the ill-drained houses. As to the river, Professor Frankland repeatedly reports its continued impurity.

MALFEASANCE MAINTAINED AS THE EPIDEMICAL CONDITIONS OF WATER DISTRIBUTION.

By microscopical examination he finds epithelia in it, human fibrine, and in a note to me he describes its condition to be one in which the people are made, as it were, refined anthropophagi, consumers of what has formed portions of humanity. Whilst these works were in full operation up to the last decade, there was a general increase of the death-rate. Since then there have been large reductions of overcrowding in particular districts. The city of London proper has been reduced in population to about half that of Brighton. Hence there has been a check and some reduction of the death-rates; but they are now in excess by one-third.

MALFEASANCE MAINTAINED IN DRAINAGE WORKS AS CONDITIONS OF EPIDEMICS.

The great lines of the ordinary epidemics have, however, been left, and every measure which sanitary science has prepared will inevitably have to be restored, to bring up the Metropolis to the sanitary conditions of the places where they have been properly applied, was left untouched. Our subject is

ow, there and elsewhere, to check the spread ordinary epidemics coming along those lines complete sanitary measures will effectually I say effectually close, because I may adduce les where former centres of epidemics which een effectually closed to them, and in which ildren's epidemics, for example, are effectually ed.

EASANCE AS TO THE SPREAD OF EPIDEMICS IN SCHOOLS.

primary schools are the common centres of n's epidemics. We framed a set of rules for gulation of the duties of the local officers of . One of these duties was that the officer regularly visit and inspect the children of the s, and that when he detected premonitory sym- on one of them, he should separate it, and h it to its home, and there take order for its itive treatment. The course in the home would separate the well from the ill; to take order he child should be placed by itself in a room proper condition, and should have proper at- ice and appliances, and that no one else should mitted until after the disease had passed. It follow that trained nurses should be appointed t the house, and see that the health officer's in- ons are properly followed. We had provided tions of the duties of the officer of health, which ed weekly visits and examinations of children, infant and the primary schools. In going he school with him the schoolmistress would out to the inspector, or he would observe, the with the premonitory symptoms to be looked e cold shivers, the pains in the head—and separate it from the rest, and go home with amine the state of the habitation, and take for the separation of the healthy children, and the sick ones to be kept alone, and give the ite directions for its treatment; and a trained would follow with more frequent visits to see he directions were complied with. The regu- s provided for similar visits and examinations ces of work; the separation of the workers, ed by visits to the habitation, and by the re- , as far as possible, of the injurious conditions there. Had these regulations we had prepared luly carried out, they would have carried pre- ives to a great proportion of the excess of fifty nd fatal cases in the school stages, in addition adult stages of life, of the classes the most ed, and would have stopped the wide-spread of linary epidemics.

TION OF THE DEMAND FOR LARGE HOSPITALS HOME TREATMENT AND SMALL HOSPITALS FOR EPIDEMICS.

would have reduced the demand for hospital modation to the minimum. Dr. B. Richardson ely examined the subject on the difficult ques- present of hospital accommodation to meet all-pox epidemics in the Metropolis. He that by provisions for home treatment in y with those provided for in our regulations, emand left after home treatment would be by four small refuges or hospitals capable of g from ten to fifteen cases each; that such gement would meet all the necessities of that mic for Marylebone, with its hundred and fifty and of population. But by our successor, who ot instructed in the local administrative organ- n needed, our regulations were superseded.

RECLAMATION BY MEDICAL AUTHORITIES OF THE RE-ENACTMENT OF THE ORDERS OF THE FIRST GENERAL BOARD OF HEALTH.

I consider this act as an administrative disaster, as a culpable misfeasance and nonfeasance, which has cost, and is costing, throughout the country many thousands of preventible deaths. In justification of this conclusion, I may state that by a select committee of the British Medical Association, appointed to consider the health laws, the same regulations have been reprinted, held forth and circulated, as models of sanitary regulations, of which they call for re-enactment. This view has been emphatically reinforced by all the medical Quarterlies. On re-examination it will be found difficult to deviate, without detriment, from the course of action which those regulations provide.

MODE OF STAYING THE SPREAD OF ORDINARY EPIDEMIC.

Meanwhile, until justice is reclaimed for the administrative service in behalf of the public, as much as possible should be called for by appeal for voluntary effort. Of what this may do in preventing the spread of the ordinary foul-air epidemics, I will state the experience of a nurse of twenty years' practice as a specialist in dealing with the most infectious and dangerous of them, namely, scarlet fever. Her chief practice was the common one in respect to all cases of the varied epidemics—to isolate the patient in a single room, the upper room if possible, and let no one else enter it; to so arrange as to keep the door and part of the window open in order to let a current of air pass through the room over the patient; to observe all the details of regulations as to the cleanliness of the patient and the articles of clothing and furniture, and the removal of excreta, etc., and as to her own personal protection, never to drink out of the same vessel that had been used by the patient, and to wash from head to foot twice a day with tepid water, and to change her clothes each day. With these precautions, she had never had a single case of the spread of the disease to a member of the family or anyone else during the twenty years; nor had she once contracted the disease herself! A collective example of the working of the principle provided for preventing the spread of epidemics is supplied by the Sanitary Aid Society near here, at Hastings, and at St. Leonard's, under the direction of a very able and energetic lady, Mrs. Johnston.* At Hastings, on the early information of the occurrence of infectious disease, the health officer attends, and she follows and visits from time to time more than he can do, to see that the requirements as to the isolation and treatment of the patient are duly attended to by the mother or the female resident in the house, as it may be. The service is given which would have been rendered, under our regulations, by a trained nurse visiting the patients at their homes instead of at the ward of a hospital. I am assured that the arrangement has the full efficacy we anticipated from our rule. As one example, it is stated that since it has been at work not an instance has taken place thereof the breaking-up of schools the outburst of an epidemic. On the nurse's practice therein mentioned of the protection of herself by head-to-foot washing, I may note that two medical officers who had been through the most dire epidemics in the East, stated to the Academy of Medicine, that they ascribed their immunity to their careful attending to that practice. Virchow showed, at the Medical Con-

* See SANITARY RECORD for June 15, 1880, and June 15, 1881.

gress, that Pasteur's germs must have a predisposition or a nidus.

FREQUENT BODILY ABLUTIONS PROTECTIVE AGAINST EPIDEMICS.

It may be that the ablution destroys them. However that may be, I consider it an important topic that escaped our attention on the occurrence of the great epidemic we had to deal with. If it were to occur again, I certainly would proclaim and enforce the active application of soap and water as a preventive. I had subsequent opportunities of observing its action as a factor of sanitation. I may state that I have received accounts of it, showing its efficacy, such as this. In one orphan institution, where the death-rate was twelve in the thousand, a cleansing of the place, the removal of cesspits and foul drains ere the cleansing was effected, the death-rate was reduced to eight in a thousand; and next, a cleansing of the person was effected by a constant ablution with tepid water, and then a reduction by another third, or to four in a thousand, was achieved. Other experiments tend to establish the value of personal cleanliness as a preventative factor at one-third.

EPIDEMICS EXCLUDED FROM INSTITUTIONS IN GOOD SANITARY CONDITIONS.

It is to be borne in mind that our immediate object is the prevention of the spread of the foul-air-diseases occurring on the lines of the ordinary epidemics, whilst Sanitary Science has now evidence of the primary prevention, or the possibility of their occurrence; as in institutions, such as well-managed district schools on the half-time principle, where the children's diseases, as they are called, are, as of primary origin, banished; where a case of typhus has not been seen for years; as in well-administered prisons, the walls of which cannot shut out the epidemics of a climatorial character; but where, whilst they are freed from them, the surrounding populations are ravaged by them. In staying the spread of the ordinary epidemics by home treatment, or treatment in small refuges, we are saving the sufferers from the vastly increased dangers which statistics now demonstrate to be occasioned by collections of sufferers in the best appointed and the best managed huge hospitals. It may be objected that the intrusion of house-to-house treatment will not be accorded.

GOOD LOCAL APPOINTMENTS OF PAID SANITARY OFFICERS A MEANS OF ECONOMY.

As a matter of experience I can state that the house-to-house visitations, which we ordered under a penalty, during the visitation of cholera, was everywhere well received, and that we did not hear of such refusals, or of any case for the infliction of a penalty. All, however, would depend upon the manner in which law is executed, and the securities taken for the proper qualifications of the officers of health for the performance of the duties set forth in our regulations, the need of which has been reiterated on the part of the British Medical Association. The expense of the personal for the requisite improvement local organisation may be objected to by those who have still to be informed of the wastefulness of ignorance and of unskilled service. The extension required would be the attribution of some three thousand local health officers, who would be under the control of the Local Government Board, forming part of the greater local administrative force, including that for the relief of destitution, with which that Board is now charged. Objections were made locally to the appointment of some seventeen thousand paid local officers, including medical officers, on the principles of administrative organisation, set forth in my report of 1833, on the administration of relief to the destitute. By that expenditure the administration was, with all shortcomings, vastly improved, and an economy effected of more than one-half over the unpaid services of the overseers and of the parish officers; such half amounting to upwards of four millions. Since then, by error in superior administration, it has been sent back, and the economies of the local taxation have been reduced. But here again I have the consolation of the vindication of principle by the recent reclamations of the representatives of the new local sanitary authorities (the Boards of Guardians), who have sent petitions to both Houses of Parliament, praying for a return to a more efficient administration of those same principles of 1833.

PETITIONS FOR THE ADVANCED APPLICATION OF THE ADMINISTRATIVE PRINCIPLES LAID DOWN IN 1839 FOR ECONOMY AND EFFICIENCY.

Petitions of the same tenor have been sent to Parliament from the Chambers of Agriculture with a view to the relief of the pressure of local taxation in the rural districts. With the warranty of part success in the economy of local rates by improved administration, I can undertake that, if I were in a position to examine the administrative officers myself, I could demonstrate the practicability of a relief to the amount of some three millions per annum of the local taxation, in compliance with the prayers of the petitioners, and, in that economy, there would be included improvement of the local sanitary service, which the British Medical Association have sought for in an improvement of the status of the executive sanitary local officers. In fact, the foregoing propositions may be now presented in the following light, viz.: that the object of sanitary administration is not merely to reduce suffering or alleviate misery, but to save money; and that our immediate object of preventing the spread of epidemic disease is to prevent the spread of charges for curative relief or for funerals, and to prevent the cost of extended working disability, which must be borne on the rates or by somebody. It is a defect of our fiscal system that it gives only an account of expenditure, and is heedless of the results; and, in other words, gives no account of them in savings. In a recent report by the Local Government Board it is shown that sanitary administration in England and Wales during the last decade has, by scattered local exertions, somewhat emerged from the dead level, in which an inefficient reactionary administration had kept it, and that during the last decade there has been some movement and a reduction of the death-rate by nearly four and a half per cent., chiefly from the diseases prevented by sanitary work, and that this amounts to a saving of a quarter of a million of lives, and at least of three million cases of sickness (with proportionate amount of cash). For I have shown that this means, that, in the saving of the expenses of a quarter of a million of funerals, and of the cures of three millions of cases of sickness, the result at the very least is an economy of four millions of money, during the decade, in England and Wales.

PECUNIARY GAINS BY EFFICIENT SANITATION IN THE CIVIL SERVICE.

This saving of money by sanitation is, however, estimated on a reduction of the general death-rate

our and a half per cent., whilst we have be-
a various parts of the country, examples of
ctions of death-rates by twenty-five and
r cent., through rudimentary, very rudi-
sanitation. But the economical operation
t more closely in view in the case of the
Whilst the losses by the sword had been as
previous losses by disease had been as here-
more than three. On the return of the
n the Crimea, the service whose concern
the smaller loss was honoured and con-
further care and improvement; whilst the
e service, conserved in the larger conserva-
rce, was allowed to pass away unnoticed
warded. But it did appear to me that
e rendered by the Army Sanitary Com-
composed of sanitary officers trained
first General Board of Health, who, it was
by the War Minister, had saved the second
he Crimea, had been allowed to pass away,
and unappreciated—when it did appear to
he experience gained in the Crimea might
ied to the saving of our army in India, and, in
rote an expository paper to that purpose.
stance mainly of the Secretary of State for
Miss Florence Nightingale, a Commission
ar Department was got to work as a Com-
or the Protection and the Sanitary Improve-
he Army in India and other places. The
that Commission for twenty years has been
mainly by two of the sanitary commis-
ained by us, whose labours had saved that
the Crimea; namely, Dr. Sutherland and
rt Rawlinson.

LES OF ECONOMY OF MONEY BY GOOD ITATION IN THE MILITARY SERVICE.

last returns it appears that the death-rate
dian army, which was formerly 69 in a
, was, during the last decade, 20 per 1000;
during that decade there has been a saving
28,000 men, and a saving of force from
of about the same number, and a total sav-
arly double the British army at Waterloo.
count is taken of the saving in money. It
er-estimate at £100 per man, which makes
y-saving during the decade £5,321,700 for
d: an economy which may be commended
ention of the Premier as Chancellor of the
er, and to Parliament, with the assurance
a due attention to past sanitary service,
he improvement of its organisation, and
position for the future, a yet greater econ-
be effected. In further assurance of this,
recall the partial economies of sanitation
the economies first achieved, as I have re-
our defences against the extraordinary
with which we had to contend, when the sav-
the expenses of funerals from premature
roughout Great Britain must have been
much as if the whole of the present popu-
he City of London, 50,000, were killed and
interred separately. We may add to this
iary economy of the saving of force by the
the health and lives of the second army
imea, acknowledged to have been achieved
y the specialist trained under our Board.
r we may, I submit, claim credit for the
economies of the past for the sake of the
ow especially—in claiming as a source of
if properly conducted, the relief of the
n from the pecuniary burthens, direct and
indirect, inflicted upon them by the continued retention of removable conditions of the ordinary as well as of the extraordinary epidemics.

GENERAL CONCLUSIONS FOR THE PREVENTION OF THE OCCURRENCE AND OF THE SPREAD OF EPIDEMICS.

I now beg to recapitulate the chief conclusions which the facts in question appear to establish.

That cases, of small-pox, of typhus, and of others of the ordinary epidemics, occur in the greatest proportion, on common conditions of foul air, from stagnant putrefaction, from bad house drainage, from sewers of deposit, from excrement-sodden sites, from filthy street surfaces, from impure water, and from overcrowding in foul houses.

That the entire removal of such conditions by complete sanitation and by improved dwellings is the effectual preventive of diseases of those species, and of ordinary as well as of extraordinary epidemic visitations.

That where such diseases continue to occur their spread is best prevented by the separation of the unaffected from the affected, by home treatment if possible; if not, by providing small temporary accommodation; in either case obviating the necessity of removing the sick to a distance, and the danger of aggregating epidemic cases in large hospitals—a proceeding liable to augment the death-rates during epidemics.

The skilful and complete works of sanitation and the removal of the conditions of stagnancy and putrefactive decomposition are the most efficient means of reducing the expenses of excessive sickness and death-rates.

For my own time there is little left to me but the valedictory vindications of established and experienced principles, and, for the sake of their advanced application, I would conclude in the terms of a passage, which I quoted in my report of 1842, from a distinguished communicant and supporter at that date—Dr. Wilson, of Kelso. After having noted some improvements which had taken place, as it were, accidentally, and independently of any particular aids of science directed to their furtherance, he observed: 'It is impossible to avoid the conclusion that much more still might be accomplished could we be induced to profit by a gradually extending knowledge, so as to found upon it a more wisely directed practice. When man shall be brought to acknowledge (as truth must finally constrain him to acknowledge) that it is by his own hand, through the neglect of a few obvious rules, that the seeds of disease are most lavishly sown within his frame, and diffused over communities; when he shall have required of medical science to occupy itself rather with the prevention of maladies than with their cure; when Government shall be induced to consider the preservation of a nation's health as important as the promotion of its commerce or the maintenance of its conquest—we may hope then to see the approach of those times when, after a life spent without sickness, we shall close the term of an unharassed existence by a peaceful euthanasia.'

At a meeting of the St. George's, Hanover Square, Board of Guardians, the project of sending pauper children to Canada, to be placed in the families of farmers, was warmly espoused by Sir Rutherford Alcock, K.C.B., and it was resolved to further memorialise the Local Government Board to grant permission to the guardians to effect the emigration of orphans and other English children now maintained at the cost of the union.

HOUSE INSPECTION.*

By Professor Fleeming Jenkin, F.R.S.

The points as to house inspection I would urge as established by experience are the following :—

1. The inspection should be experimental.
2. The inspection should be periodic.
3. The inspection should be made by a professional engineer, who should have no interest in any expenditure he may recommend.
4. An inspection of this character can be efficiently and cheaply carried out by making use of the principle of co-operation.

Let me then first explain what is meant by saying that the inspection should be experimental. It is commonly supposed that to investigate the sanitary fittings of a house thoroughly, it would be necessary to rip up floors, tear down panelling, break open plaster, and lift the pavement of the ground floor. Householders prefer to run some risk of typhoid fever. With a more rational system of arranging the plumber work in a house, the pipes could be readily inspected without this demolition, and it is heartily to be desired that architects would give their minds to arranging every pipe so that every yard of it can be seen with little trouble, and repaired without inconvenience.

The first principle an engineer is taught in the drawing office is this :—Every part of a machine must be readily accessible for inspection and repair. The water and drain system of a house constitute a large and complex system, but architects and builders have sadly neglected this condition of accessibility. The sanitary engineer must, however, deal with existing houses as he finds them, and contrive experimental tests by which the fittings can be proved, without being actually seen from end to end. When an old house is inspected for the first time, some disturbance and expense are almost necessarily entailed. No inspection deserves to be called inspection, which does not make sure that the house-drainage system really is connected with the town sewer. To make sure of this, the ground must be opened between the house and the sewer, the drain broken into, the flow of the sewage from the house inspected, and the condition and structure of the drain examined. But when this has once been done, it is easy to insert an inspecting man-hole, or simple eye with a lid easily removable, by which on all future occasions the necessary examination can be made with no disturbance, and at no expense. Even the first opening of the drain does not usually involve any inconvenience, for the work can usually be completed outside the house. The inspecting eye or man-hole can be made use of for other experimental tests. Thus, the second point of cardinal importance in drainage is, that pipes conveying drainage through any part of a house should be *watertight*. I shall be told that no pipe ever should cross a basement ; so be it. But in old houses built in streets with a sewer in front and water-closets at the back, the drainage pipes *must* cross the basement. We cannot avoid this defect of design, and must render it as little noxious as possible. This we can do, by ensuring at least, that the pipes shall be watertight. This can be tested experimentally. The whole network of pipes up to a certain level can be filled with water, while the outlet at the inspecting eye is stopped with a clay plug. If the water does not sink, then the system is water-tight. This inspection ensures the excellence of the underground channels, without disturbing a single paving stone, or interrupting the servants in their work for a minute. Experience has shown, however, that no drains laid in old houses will stand this test. Builders are positively aghast when drains are specified which are to be subjected to this test. They have to be told that it is the commonest test in the world as applied to pipes laid by contractors for engineers, before they will consent to undertake such a responsibility as keeping water in a pipe under, say, six feet of head, or pressure.

The builder has thought until now, that if he provided an open channel with a sufficient fall, and with smooth joints inside, he had executed first-class work. The fact that the joints would let sewage ooze out and gradually saturate the basement, was not taken into account. We can, by experimental inspection, guard against this danger.

The third point of inspection I take to be ensuring that the system of piping throughout the house shall be *gastight*. No doubt, by careful ventilation and thorough flushing, the inside of drainage pipes may be kept moderately clean, but it will always be our duty to stop all direct communication between the insides of the pipes and the rooms of our houses. The sewer gas inside the pipes may be present in very small quantities or may be of a very mild type. Nevertheless it should not be admitted to our houses.

We can experimentally test the staunchness of the pipe system by introducing some strong smelling volatile substance, such as paraffin or oil of peppermint. If this be poured into the pipes by a man outside the house, and if an inspector with a good nose goes over the house carefully, room by room, he cannot fail to detect the existence of holes in the piping, when these exist. This third experimental test detects faults of design, faults of execution, and faults arising from decay. Often we find that some unforeseen and unguarded bye path exists by queer cross connexions, leading sewer gas straight into bed-rooms or bath-rooms. Often we find in this way dry traps leaving an unguarded hole.

Often we find badly executed joints, where the soldering is so imperfect that a finger could be introduced into the gap. Often we find that work originally good has in the course of time decayed, so as to leave numerous vents from which sewer gas can issue. It will be seen that this experimental test is really more searching than the much dreaded tearing down of panels and breaking open of plaster, which only becomes necessary when the existence of a defect has been proved.

In what has been said small allusion has been made to the original design and arrangement of the sanitary fittings. The public are too apt to assume that sanitary inspection means calling in one sanitary engineer to condemn what another sanitary engineer has just recommended.

But if every house were perfectly drained and fitted with the best sanitary appliances, the inspection described in this paper would be necessary. We should still require to test experimentally whether—

1. The pipes were choked.
2. The drains were watertight.
3. The pipes were gastight.

This leads me very naturally to the second head of my paper, the inspection should be *periodic*. It is not enough to call in the engineer and have all put in the best order once in a way. This is indeed very necessary in most cases. How necessary few

* Paper read at the Brighton Health Congress, Dec. 1881.

know; but when it has been done the inspection must be maintained. The case is quite analogous to that of a steam boiler. We must in the first instance provide ourselves with a good article designed by competent engineers and experimentally tested, but we must also pay competent men to come year after year and examine whether any deterioration has occurred. I am continually told, when I press friends to join an inspection association, 'Oh, our house does not require it; our drains were all put right five years ago by Mr. So-and-so,' naming an authority of undoubted weight. My answer is, 'You, oh my friends, are the very people who should welcome the inspector. You will incur no expense beyond that of mere inspection. I could understand your objection if you were in a very bad state, because inspection might involve you in great expense, might turn you out of your house for weeks while alterations were being made,' and so forth.

Sometimes my friends are persuaded, and sometimes I find their excellent drains choked, their excellent lead pipes burnt through by lime, or cracked by settlements, and it is well worth while to pay an inspector a guinea a year to ensure you against these accidents, which have cost more lives than all the boiler explosions that ever have or ever can happen. The number of accidental injnries to pipes is great beyond belief. In London we find about six per cent. of the houses inspected have their drains choked, so that the whole of the sewage oozes out into the basement; and over thirty per cent. of the whole show considerable leakage of sewer gas through faulty pipes when tested by oil of peppermint. Nor do these things occur only in houses where there is some reason to believe defects exist. It is a common fallacy to suppose the inspector should only be called in when some danger or nuisance is proved. This is like calling in the engineer only after the boiler has burst. If every house in London were tested at this moment, it is my conviction, based on experience, that the above proportion would be maintained; one in every twenty houses would be found not to be drained at all; the air in rooms of one in three would be found in direct communication with the town sewers, and this has little or nothing to do with faulty design, unless, indeed, our whole domestic economy of receiving water into our houses clean, and sending it out foul into a common receptacle, be called faulty design.

The next point for consideration is, who shall make this periodic experimental inspection. Some say the householder himself. They contend that these tests are very simple, and such as a man of sense can himself carry out with the aid of shilling handbooks. This may be true, but the man of sense never will do it. He has so many other engagements, and sewage is such an unpleasant subject, that he will not rout out manholes in the area, put his arm into traps half full of dirt, climb up under the slates to inspect cisterns, get on to the roof to pour down oil of peppermint; he will pay some one to do it for him. Moreover, a man who is his own doctor has a fool for his client. The same thing is said of law, and perhaps the same thing may be said of engineering: the amateur engineer does not command my confidence, even when dealing with drains.

Others say the inspection should be carried out by the town officials. In this I heartily concur, but, while the law and custom are what they are, this cannot be done. We find that for thorough inspections, such as I recommend, one man can undertake 400 houses per annum. In Brighton there are, perhaps, 17,000 houses, and therefore the town authorities should have forty inspecting engineers to do what has been here recommended once a year for each house. In course of time the Medical Officer of Health will have these forty engineering assistants, and the sooner the better, but it will not be this year or the next. Let us agitate for improved official inspection, and strengthen our argument by showing what can can be done by private organisation.

Some say the plumber should make the inspection. Many plumbers are competent to do so, some are not. Few, at present, carry out these inspections, and in my opinion they are not the proper persons; they have an interest in recommending alterations and repairs. The adviser of the householder should be quite disinterested, and should be capable of inspecting work executed by the plumber. The best of contractors work better under inspection, and this we find by experiment is also true of plumbers.

We come lastly to the professional engineer or architect as the proper person to inspect in the way suggested. He can not only carry out the tests described, but he is competent to give an opinion on the merits of the general arrangement of pipes in a house, on the design of the sanitary fittings, on the condition of the cisterns, and on the supply of water; all points of great importance, though they have been subordinated in this paper to the one question of *inspection*. That a well-educated disinterested professional man is the proper person to advise and inspect seems so clear, that the only remaining point is to consider how to find such a *rara avis*, and how to induce him to undertake the work at such moderate rates as the average householder can afford. This brings me to my last point, namely, that the experimental periodic inspection by a skilled disinterested man can best be obtained by making use of the principle of co-operation. When three or four hundred persons club together, they can, by subscribing three or four hundred guineas, pay a salary which will secure the services of a well-educated young engineer or architect of good standing. Between the ages of 24 and 30 the salaries in these professions do not run much higher than from £150 to £300 per annum, and this single engineer can, as has been proved in Edinburgh and London, inspect the 400 houses. This must be taken for granted. On the one hand they may be told that one inspector of nuisances can thoroughly inspect sixteen or twenty thousand houses per annum, and on the other, that no inspection is worth anything which costs less than fifty or a hundred guineas. Both statements, though somewhat less crudely put, are made with unfailing regularity at every meeting where this subject is discussed. I appeal to experience. For four years the leading doctors, bank directors, hospital managers, and householders in Edinburgh have tested our system of inspection. Hundreds, I may now say thousands, of houses have been inspected under it, and not one person who has had the inspection made has ever complained that the inspection was not thorough; and letters are constantly received expressing the greatest satisfaction at the care given. The system is spreading in London, Bradford, Wolverhampton, and elsewhere. Liverpool, Brighton, and Plymouth are discussing plans for its adoption. The idea is no longer a speculation, but has been put to the test of four years' experience among the shrewdest of the inhabitants of these islands. Not only does co-operation enable you to pay a man of your own to conduct these inspections, but it places his appointment in the hands of a local committee, under whose

eye he works. They should be men whose names are a guarantee to the citizens that the appointment of the engineer is honestly made, and that his work will be honestly watched.

Co-operation will do still more. It will provide a retaining fee sufficient to pay a consulting engineer of standing, who will exercise such a general supervision over the executive engineer as to ensure the adoption of sound principles and the avoidance of all quackery. These are the principles which led to the establishment of the Edinburgh Sanitary Protection Association, and which I trust may lead to the establishment of a similar association for Brighton.

The one difficulty, so far, in starting local associations has been that of finding at the start a sufficient roll of members to justify the appointment of a resident engineer.

In these cases the proper course seems to me the following.—Let the inhabitants of a town like Brighton join a central association, such as that over which Professor Huxley presides, at 7, John Street, Adelphi, London. Let a local committee of supervision be appointed to watch how the London officers do their work and to promote the interests of the local members.

Whenever the number of members in a given town justifies the step, let the local committee constitute themselves a council for a local independent association, appointing officers of their own, who might often come from the central association. In this way no pecuniary risk would be run. The London association is not a money making society, and would be heartily glad to be the means of establishing the nucleus of successive associations in successive towns.

The breaking off of each descendant from the parent association would be a matter of still greater rejoicing than the starting of a new affiliated branch.

It is much easier to begin any work of this kind by degrees in each town than to create an independent and completely organised society from the first.

Unfortunately the system of inspection proposed only meets the case of persons who can afford to pay at least a guinea per annum. But if we can show what inspection is possible and how great the need of that inspection is, we shall have neared the point at which inspection will become compulsory. No argument for compulsory inspection that has ever been brought forward has a tithe of the force of that established by the London Sanitary Protection Association—namely, that even among the better houses one twentieth part is not drained at all.

It is reported from Adelaide that no less than 12,000 persons have been vaccinated there within two months, in consequence of the outbreak of small-pox in New South Wales.

A considerable epidemic of scarlatina and measles is reported amongst the children in Berlin. A very large number of the children in the schools are ill, notwithstanding that the floors of the class-rooms have been disinfected with a five per cent. solution of carbolic acid, and spray diffused throughout the rooms. The only effectual preventive, however, would be to close the schools, according to the English practice in such cases. The mortality of children is lamentably high. We read that from 1877 to 1880 no fewer than 5,214 children, under ten years of age, died of diphtheria, and this year the mortality from the disease has been still higher, having been 1,736 during the eleven months. Diphtheria has also been very prevalent and fatal in Hamburg, Munich, Dresden, Breslau, Königsberg, Stettin, and Dantzig.

NOTICE.

ON February 15th, there will be published SANITARY RECORD, the first of a series of by a Fellow of the Royal Institute of Britis tects, entitled

NOTES ON SANITARY MATERIALS APPLIANCES

USED IN THE CONSTRUCTION OF HO INFIRMARIES, AND PUBLIC INSTITUTI

Comprising descriptions of materials use WALLS, as Damp-proof Courses, Hollo Ties, Glazed Bricks, Concrete Walls.— Roofing Felt, Ventilators.—FLOORS. Stone, Stone, Brick and Tile Pavings, Fire-proof Concrete and Cement Floors, Asphalte, Paving, Wood and Parquetry Floors.—WI Appliances for Opening, Closing, and Re Sashes. — TREATMENT OF INTERNAL F WALLS. Plaster, Cement, Tile, and othe Coverings, Washable Paints and Disten HEATING, LIGHTING, AND VENTILATION. Ranges, Steam Boilers, Cooking Apparatu water Apparatus, Ventilating Gas Lights.—FI Cisterns and their fittings, Filters, Baths and tories, Water and Earth Closets, Sinks, Slop Urinals, Drains and Traps, Flushing App Ward Furniture, Dispensary Fittings, Lifts, La Fittings, Disinfecting Apparatus.

THE

SANITARY RECOR

JANUARY 15, 1882.

The Editor will be glad to receive, with a publication, announcements of meetings, r proceedings, and abstracts or originals o read before the members of any sanitary or association.

SMALL-POX STATISTICS IN LIVER

IN our last issue, we referred (page 223) to a graph in an evening contemporary regarding ment recently made, at a meeting of the Li Board of Health, as to the comparative mo from small-pox treated at home and smo treated in hospital. We regret to learn that report was in no essential incorrect, and that Hamilton, the medical member spoken of, did as make the statement referred to. In opposi compulsory registration of infectious diseases medical attendant, he said that removal to ho was often attended with dangerous consequences as a proof of this, he alleged that during th demic of 1877, of 1,660 cases treated at their homes 138 died, while out of 314 removed t

pital no less than 161 died. Writing to a Liverpool paper in explanation of these figures, he strives, in what we cannot but regard an unsatisfactory manner, to justify the conclusions at which he arrived. He says :—

'The statistics I gave were taken from the Medical Officer of Health's report for 1877. On the large sheet at the end of the report, it will be seen that 299 deaths from small-pox are recorded, and that of these, 142 occurred in the West Derby Union, and 19 in the Netherfield Road Hospital, making together 161 deaths from small-pox in these two institutions, and leaving 138 deaths from the same disease distributed over all the other districts of the parish and out-townships. At page 49, it is stated there were 314 cases of small-pox removed to hospital. On the strength of these figures, I stated that 314 persons suffering from small-pox had been removed to hospitals, and of these 161 had died. At page 36, a list of the cases of small-pox reported to the Medical Officer of Health during 1877 is given, and this list amounts to 1,660 cases. I think I was fully justified in stating the remaining 138 deaths had occurred amongst these. In fact, there must have been numerous other cases of small-pox amongst the better classes of which the Medical Officer of Health was never cognisant, whilst every death was reported to him; so that if we deduct the 314 persons removed to hospital from the 1,660 we should still have the latter number more than made up by unreported cases.'

Turning to page 49 of the Report for 1877 of the Medical Officer of Health, we find that during that year 314 cases of small-pox are reported as having been removed to hospital. This number, however, refers only to the cases removed by the Health Authorities, and does not include the more numerous cases removed by order of the Poor Law and Dispensary Medical Officers and private practitioners. The 1,660 reported cases Dr. Hamilton regards as not including the 314 already alluded to, and as having all been treated at their own homes. How his conclusion was arrived at we fail to understand, and our perplexity does not diminish on examination of the report. On page 36, from which page we are told the figures were taken, the cases reported are tabulated according to their residence. But only 1650 cases are thus tabulated, while of the remaining ten, a foot-note explains that 'seven were admitted into hospital from ships, and three others having no place of abode, making a total of 1,660 cases.' It is hence obvious, that to arrive at the number 1,660,—the number of cases declared to have been treated out of hospital,—it was necessary to add to the 1,650 tabulated cases, ten other cases which are explicitly stated to have been treated in hospital.

In the letter we have quoted, Dr. Hamilton goes on to explain how it seemed to him the greater mortality in hospital arose. This he attributes to the dread, the dislike, the horror, which the majority of people suffering from an infectious disease feel at the thought of being taken to hospital.' Moreover, he thinks, 'there is no doubt the exposure to chill, necessary to removal, sometimes leads to an unfavourable issue.' As to the risk of chill, we need only remark that it may effectually be guarded against by a proper method of removal, and that, even if it be necessary, a person in a state of fever is the very last to be affected by it. That the dislike to removal to hospital exists in many minds we are ready to admit, but we doubt whether this aversion, even if it reached the intensity pictured in the sentence just quoted, could raise the mortality from 8 to 51 per cent. Our own experience, including several thousand cases of small-pox treated in hospital, leads us to believe that the influence of removal on the mortality is little more than infinitesimal.

Referring, again, to the report of Dr. Stopford Taylor, we find it stated on page 35, that during the period between the end of May 1876 and February 1877, there were admitted into the hospital at Mill Road 1,021 cases of small-pox, of whom 158 died. This gives a mortality of 15.5 per cent. If, then, Dr. Hamilton's figures be correct, we must believe that after February 1877, the shock and the chill attending removal developed so malignant an influence as to raise the mortality from 15 to 51 per cent. That such an extraordinary change should thus rapidly take place is hardly credible, and we are therefore led strongly to doubt the correctness of the premises from which it is the logical inference.

It is thus apparent, from the preceding considerations, that not only does the injudicious statement of Dr. Hamilton receive no justification from, but, on the contrary, is emphatically condemned by, the report of the Medical Officer of Health. As a matter of fact, moreover, the figures are, so far at least as the hospitals are concerned, altogether inaccurate. During the year, there were admitted into Netherfield Road Hospital 162 cases, of whom 23 died, a mortality of 11.7 per cent. The exact number admitted into Mill Road Hospital we have been unable to obtain, but we are assured that the mortality was about 14 or 15 per cent. The combined mortality of the hospitals is thus very much lower than 51 per cent. The mortality among the cases treated at home, since the numbers so treated cannot be ascertained, it is of course impossible accurately to calculate. Considering, however, that 1,660 cases were reported to the Health Authority, while over 1,000 were treated in hospital, and making a liberal allowance for unreported cases treated at home, we think we shall not be far wrong in concluding that the mortality among home treated cases was, at any rate, not less than among hospital treated cases.

Dr. Hamilton closes his letter of explanation with a protest against the compulsory removal of the sick poor. 'Why should the poor', he asks, 'any more than the rich, have their sick and dying removed without their consent?' To this question the answer is ready. The poor are removed, not because they are poor, but because, there being no means of isolating them in their own homes, they are a standing danger to the community. Removed to hospital, they can be effectually isolated, and the isolation can be continued till all danger of infection is past. The community removes them to protect

itself; and if the rich could not, or would not, carry out the necessary means of isolation at home, then they also should be removed. It is but the merest folly to talk of carrying out 'all the means of disinfection to the utmost' if this, the first and greatest means, be incapable of execution. If, however, removal to hospital were to prove injurious to the sick persons removed, then it would become a question whether the community should persist in protecting itself at the expense of a few of its members. Hitherto, it has been believed, that not only was the isolation beneficial to the community, but that it was also highly beneficial to the patient. From a small room in which in many cases live several others,—a room dirty, badly ventilated, and but ill lighted,—with insufficient and unsuitable nourishment, with willing, perhaps, but ignorant nursing, the sick patient is removed to the comparatively large, well ventilated, and well-lighted wards of the hospital, where he receives suitable and sufficient nourishment, and where he is tended by persons who have at least some knowledge of nursing. The change would appear to be as favourable to the patient as to the community. So strong is this presumption of benefit to the patient, that clear evidence to the contrary must be brought forward before it is abandoned.

Were the removal to hospital of those suffering from infectious diseases to cease, the results would prove disastrous, not to the rich only, but also, and in much greater measure, to the poor. The poor would thus be deprived of their best, and sometimes, only chance of recovery, viz., the skilled nursing, the sufficient and appropriate food, the fresh air and the sunlight of the hospital ward. Both rich and poor,—the latter necessarily of course to a greater extent,—would suffer from the wholly unrestricted spread of infection, due not only to imperfect isolation, but to the unregulated visits of relatives and friends to the sick room, and to the fact that pressed by want or family cares, or through sheer carelessness, the convalescent, while still a source of danger, may go orth to his daily work, spreading the disease far and wide. It is assuredly undertaking a grave responsibility to discourage in any way the use of the hospital. We regret, therefore, that a member of the medical profession, especially with the authority naturally possessed by a member of the Board of Health for the third city in the kingdom, should have committed himself to a statement so inaccurate, and so much calculated to prejudice hospital treatment in the mind of the public.

A VETERAN SANITARY REFORMER.

GEORGE VARRENTRAPP, son of Prof. Joh. Conrad Varrentrapp, was born on the 20th of March 1809, at Frankfort-on-the-Maine, his father being chief physician in that town. After completing his Gymnasium course, he studied at Heidelberg, Strassburg, and Wurzburg; took his degree as doctor on the 9th October 1831; and was soon after received as practical physician in his native town. His thesis bore the title: *Anatomical Observations concerning the Cephalic part of the Sympathetic Nerve and its connection with the Cerebral Nerves.* In the year 1834 he, in conjunction with the physicians F. Hoffman, M. Bompick, W. Fabricius, E. Schelling and Adolphe Schmidt, founded the public dispensary, his first step towards that promotion of public sanitary arrangements, which, afterwards, was so great indebted to his labours. From April 8th to July 21st, 1838, he travelled over England, Holland, and Belgium, with a special view to medical practice and, in particular, to an examination of the hospitals of those countries. The insight and experience gained in this journey were published by him in 1839 in a work entitled, *Diary of a Physician's Travels.* This work is especially worth reading at the present day, on account of the picture it gives of the state of the hospitals in England at that time.

On the 1st January 1842, Varrentrapp obtained a hospital appointment, and in 1845 became physician to the medical division of the Hospital of the Holy Ghost, the duties of which post he performed with unwearied zeal and devotion until the year 187[illegible]. From 1857 he, for several years, wrote the reports on hospital administration of the institutions for the sick and of the public sanitary arrangements of the town of Frankfort-on-the-Maine, published annually by the Association of Physicians, one of the originators of which he had been in the year 1845. When we consider that Varrentrapp had in the meantime become one of the physicians constantly employed and most in repute, it will be a matter for wonder how he could devote so much activity to the general well-being of the community. The especial point in this activity of his was its importance in various departments. In addition to his political activity, in which he always showed himself an adherent of moderate Liberalism; through his official activity, and also as a writer, he sought by his co-operation to bring about the solution of questions, chiefly, it is true, sanitary, but also those concerning the general well-being of the nation.

Thus he early devoted himself to the reform of prison administration, especially prison discipline. He was one of the first in Germany to advocate, both in speech and writing, the separate cell system for prisons. Already, in 1841, his work on penitential systems, particularly on the proposed introduction of the Pennsylvanian system into Frankfort-on-the-Maine, had appeared. In Bordeaux, his *Mémoire sur l'emprisonnement individuel sous le rapport sanitaire* had a prize assigned to it. On the 3rd September a 'Prison Congress' was held at his instigation, the Transactions of which, with a Preface by him, were published in 1847 in Frankfort. In 1856 he took a most active share in introducing the Pennsylvanian system. The 'Prison Guide Books', edited by himself, and Drs. Julius and Nöllner, were devoted to the same subject.

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TRICYCLES.

A VERY considerable impetus has been given to open air exercise, under the most favourable circumstances, by the recent introduction of tricycles. The bicycle is a machine with which it is possible to traverse great distances inexpensively, and under the most agreeable circumstances; and to the young and athletic, who do not fear occasional accidents, and who are capable of some considerable exertion, and possess ordinary aptitude for physical exercise, bicycling is the most fascinating, useful, and healthful of exercises, and a valuable means of recreation. Tricycles have, however, over bicycles the great advantage that they are suited to nearly every age, to both sexes, and the most varied physical conditions. Every one in ordinary health, and possessing the use of his limbs, can, without effort, and without previous instruction, learn to ride a tricycle. Very little practice enables the tricyclist to traverse considerable distances with ease, comfort, and safety, and at a very adequate and satisfactory pace. A pace of from seven to ten miles an hour is easily attained on the tricycle, and maintained for several hours in succession without effort. The exercise is distinctly healthful, and the mere rapid motion through the air is of itself invigorating and refreshing. Moreover, it is so much more pleasurable to many than the slower exercise of walking, and the facilities for covering an extent of ground, and getting quickly out into the country, or the most pleasant suburbs of great cities, are so great that we cannot too strongly recommend our readers generally to try for themselves the advantages of the tricycle. We are convinced that by adopting its use they will add greatly to their healthy opportunities of recreation, to their facilities of locomotion, their opportunities of frequently visiting pleasant scenery and healthy country districts, and generally to their means of enjoyment and health.

Even to those who have a well appointed stable, the tricycle will be found a very useful addition to their other resources. A horse is not always ready at the moment it is wanted. Short messages are often needed to be sent rapidly, to near or distant spots, for which it is not convenient to have a horse saddled, or to send a carriage; messages to the railway, to the post-office, short runs to the tradesmen, country errands of all sorts, or indeed town errands for that matter, are most easily executed on the tricycle. Message boys or grooms find riding and driving a tricycle a recreation, and indeed to be sent an errand on the tricycle is a sort of reward instead of a labour. Ladies can ride a tricycle without inconvenience or remark, and we have little doubt that tricycle-riding will in time become extensively used by the gentler sex as well as by our own. Medical men are beginning to adopt the tricycle for themselves and their assistants in country practice, as well as curates and clergymen; in one district near London all the clergy, and most of the doctors, go their rounds on the tricycle, which has become so customary an object in the district that no one notices it more than they would the doctor's brougham or the tradesman's cart. To medical men who keep no carriage it is invaluable.

There are several varieties, each of which have their special merits; as to which it will be interesting to hear the experience of medical men in respect to particular qualities required in various districts. The main desiderata, according to our experience, are rapid travelling, speed on dry roads and lightness and facility of propulsion on soft roads, power of

climbing, and quickness in turning in a small circle; back pedalling is also a very useful quality in tricycles, excepting in such machines as the Cheylesmore. These qualities may be combined in various degrees.

We are compelled to hold over many of the Addresses delivered at the Brighton Health Congress, and several articles of interest in type, in consequence of the great pressure on our space.

NOTES OF THE MONTH.

BURIALS IN WESTMINSTER ABBEY.

Attention has been called to the want of disinfectants in the burials which take place at the Abbey. From a letter published in one of our contemporaries it would appear that, except a small quantity of quicklime put into the coffin, nothing is done to prevent injury to health in case of a leaden coffin bursting, or having a defect in it when it was made. The coffin cannot be tested after the body has been put in it to try if it is air-tight, and, therefore, some means should be used to prevent the risk of injury to health. In many grave-yards which are partially closed the regulations in force require that the coffins shall be surrounded with cement. If this were done at the Abbey, a sufficient layer of charcoal having been previously put around the coffin, and protected from the cement, so as not to be wetted, all risk of injury would be avoided. Cannot the Dean and Chapter be induced to require that all future burials shall be so conducted as to prevent even a suspicion of risk to the public health, either by the adoption of this suggestion, or in some other manner that would be satisfactory to the Medical Officer of Health and to a chemical teacher at some adjoining medical school?

THE PROTECTIVE WORKING OF VACCINATION.

Dr. Henry Tomkins, medical superintendent of the fever hospital belonging to the Manchester Royal Infirmary at Monsall, in a paper which he read recently at Owens College, said:—'The most striking of all evidence is, perhaps, that derived from the small-pox hospitals themselves. Here the protective influence of vaccination is seen and proved in a manner beyond all cavil. At Highgate, during an experience of forty years, no nurse or servant having been re-vaccinated has ever contracted the disease; and evidence of the same character I can myself bring forward, for during the whole time that I have had charge of the fever hospital more than a thousand cases of small-pox have passed under my care, yet no servant, nurse, porter, or other person engaged there has, after re-vaccination, ever taken it, though exposed daily to infection in its most concentrated form. One woman, a laundress, who escaped vaccination, took the disease and died: one nurse, who some years before had suffered from small-pox, and was then considered protected, had a very mild attack; and this summer a workman, who did not live on the premises, but came in to work as a painter, was not vaccinated, and had rather a severe attack; and still more recently a servant, who by an oversight was allowed to go about her work three days before being vaccinated, had, before the latter had run its course, a slight abortive attack. Again, among all the students who, during the past two years, have attended the hospital for clinical instruction, not one has suffered, all having been re-vaccinated before being permitted to enter the small-pox wards. And in their case the false argument which opponents of vaccination have brought forward to explain the immunity enjoyed by nurses and others in attendance on the sick,—viz., that constant intercourse and exposure to infection renders them proof against it by the system becoming inured to the poison cannot be applied, as these gentlemen attend the hospital only a few hours once a week. I defy the most enthusiastic or conscientious of anti-vaccinators to produce evidence like this on his side of the question, or to bring forward even half a dozen persons, choose them whence he may, who have not been protected against small-pox, and expose them as the students are exposed, without more or less of the number taking the disease. Facts such as these should convert the most ardent anti-vaccinator from his folly, and convince him that a weapon of defence so powerful as vaccination should not be left to the pleasure of the individual, but that the State has the right and duty to look after its most thorough performance.'

DISTRICT MEDICAL OFFICERS IN BRITISH GUIANA.

From an article in the *Demerara Argosy*, we learn that the Governor has the power, and frequently uses it, of dismissing a Medical Officer forthwith without affording him any appeal. These dismissals appear, from the article, to have been made in some instances in consequence of 'some excess of zeal, or mistaken sense of duty, or of professional etiquette', without any neglect of duty. It appears, also, that the Government often postpone, even for a twelvemonth or more, appointing a medical officer permanently to a district, by which, in many instances, the supernumerary is compelled to do the same work, say for £600 a year, as that for which the permanent officer received £900. The editor justly points out that these abuses should not be allowed, especially as they act most injuriously on the country doctors, who have no heart for their work. The conduct of the Local Government Board towards district medical officers in this country has been strongly objected to in many cases, but they always institute an enquiry, and give the defendant an opportunity of replying to the charges brought against him. Medical men should be careful how they enter into contracts with Colonial Governments, if those in British Guiana are to be taken as an ordinary sample.

THE PROGRESS OF COMPULSORY VACCINATION.

An Act causing the above measure to come into force, has been passed by the Parliament of Tasmania, and assented to by His Excellency the Governor. Twelve thousand persons in South Australia have been vaccinated during the last two months. The registered number of vaccination cases performed successfully on children under 14 years of age in New Zealand is as follows:—1877, 10,746; 1878, 11,495; 1879, 12,384; 1880, 13,628; total during the last four years, 48,253. The National Council of Switzerland at its general meeting of Dec. 21st, had a discussion on the law of epidemics, which terminated in the adoption of the principle of compulsory vaccination, by 90 votes against 23. The articles 13 and 14 of the Law as regards epidemics now stand as follows. Article 13. Every child born in Switzerland should according to law be vaccinated in the first year of its life, or at

he latest in the second. A longer delay is not permissible, except for hygienic reasons certified by a medical practitioner. Children born in other countries and not vaccinated when brought into Switzerland, are placed under the same regulation. The vaccination to be certified by a registered medical practitioner. Article 14. No child can be allowed to enter any public or private school, unless he possesses his certificate.

LEAD POISONING.

Our attention has been called to the fact that at the Brighton Exhibition the Albissima Paint received the highest award given in its class, a silver medal, among the judges being Mr. R. W. Edis and Mr. Trace of Wigmore Street, two of the most severely critical and thoroughly well informed judges who could be named. These gentlemen submitted the Albissima Paint to a severe series of tests, as to its covering power, to its hardness and homogeneousness, to the purity of its colour, and as to the extent to which it is unaffected by sulphur compounds, and gases. We understand that the Albissima Paint has recently been used at the Bristol General Hospital, and other public institutions, and has been submitted to severe trials by the Government, in all cases with thoroughly satisfactory results. This paint appears to supply a desideratum which has long been looked for, viz., a white paint of very pure colour, of great covering power and durability, which is at the same time easy and economical in use, and free from the poisonous qualities of all lead paints. It has the advantage of being free also from any bad smell in use, and can thus be used in public institutions as well as in private dwellings, with great advantage without removing the inmates. Its superiority over the ordinary zinc paints is very strongly marked, and its great sanitary value is bringing it rapidly into use by those who aim at diminishing the number of noxious substances used for trade purposes. Of course trade considerations —the necessity of having a material facile as well as economical in use, will always have a predominating influence in indicating the selection of material such as paint, even when made of substances so poisonous and so disagreeable in use as lead paints.

MORTUARIES AND JURYMEN.

At an enquiry lately held by Dr. Diplock at Willesden on the body of a man who had died from an injury, the following colloquy occurred between the coroner and one of the jury. *Juryman*: 'Before we proceed further, you ought to be acquainted with the fact that there is now in the mortuary the body of a man who has died from typhus fever, a very bad case. I do not think the jury should be compelled to view the deceased, who is in the same mortuary.' *Coroner*: 'You must go, you must obey the law until it is altered. If you refuse to go into the mortuary, there is no objection to the body being brought out.' The jury viewed the body outside the mortuary, and retired. After the inquest, the coroner promised to write to the authorities, asking that a small isolated mortuary should be built for infectious cases. This is one out of numerous instances where the local authorities, both in London and out of it, have either neglected to provide any mortuary, or have erected only one room for all dead bodies, no matter what had been the cause of death. Although the infectiousness of the bodies of those who have died from infectious diseases has not been proved, yet, as regards those who died from small-pox or typhus there is, at least, very grave doubt in the matter. Under these circumstances, the friends of other deceased persons, undertakers, and jurymen, ought not to be allowed to run the risk of infection in such a manner. Even if the bodies would not convey disease, the cloth covering of the coffin, if any, might do so, or the clothes in which the body was enveloped, for, in such cases, the dead are often moved in a shell, which is not screwed down, and the body is coffined in the mortuary previously to burial. It is, therefore, to be hoped that the Willesden authorities, and others who have not made proper provision for the dead, will erect places such as will not shock the susceptibilities of, or spread diseases amongst, those who are compelled to go into these buildings.

ZYMOTIC DISEASE CHARTS.

A circular and specimen chart have lately been sent round to the clerks of many Urban Sanitary Authorities by Mr. Yates, recommending the use of skeleton maps, with marks to be made thereon showing the cases of and deaths from the seven chief zymotic diseases. He recommends strokes to indicate cases, and crosses to mark the deaths; different colours being used for each disease. Thus, it is proposed that scarlet fever should be shown by red, enteric fever by black, small-pox by pink, measles by light blue, diarrhœa by chrome, whooping-cough by sienna, and diphtheria and croup by green. The plan is by no means new, although from the circular it might be supposed that it is. Thus, in the Newcastle map, the medical officer uses crosses for deaths, and spots (dots) for cases, the colours being red for scarlet fever, green for enteric fever, blue for whooping-cough, and chrome for diarrhœa. In the Birmingham map the deaths only are shown, a red spot representing scarlet fever, a red cross, measles, and a blue cross, typhoid. Similar maps are used in other Urban Sanitary Districts, and are very useful as showing, at a glance, the prevalence of disease, and the deaths from these diseases.

THE HEALTH OF NAVVIES.

In view of extensive canalization soon to be done in France, the Minister of Commerce lately consulted the Academy as to measures that should be taken to preserve the health of the workmen who will be engaged on them. A report by M. Colin is the result, in which he notes the persistence of a depressed vital state in certain parts of the country, especially the coast departments, which are chiefly concerned in the works projected. Marshes with their miasma are not the sole cause of this 'impaludism', as he calls it; but virgin soil, newly turned, emits morbid germs, whence arise intermittent fevers, etc. With regard to precautionary measures, the report specifies the following:—1. Fragmentation of work, not attacking too many points at once, not entering on a piece of work before the piece next it, begun previously, is finished. 2. Choosing strong, vigorous navvies, by preference inhabitants of the region; and 3. Diminishing the time of contact with the soil. The work should be stopped at times when it is known to be dangerous—viz., July, August, and September, and in the extreme morning and evening hours. Evening vapour on plains and low-lying parts is very dangerous. Large fires should be lit in the works morning and evening.

4. The navvies should be lodged in neighbouring centres of habitation, as much as possible in the heart of towns and villages, and on high ground, or, where near the sea, in pontoons moored at some little distance from the shore. Fevers do much less injury among workmen who reach their homes at night, than among those who remain on the works. 5. A special diet. Before his work the navvy should have a substantial hot meal; preventive medications (such as arsenic, extract of nux vomica, and sulphate of quinine) have not yielded such results as recommend their use. 6. Immediate conveyance to the hospital of a navvy attacked by fever, and caution as to premature re-engagement of men discharged from hospital. 7. Early filling of the excavations, admitting water, in urgent cases, to parts which prove peculiarly infectious, and stimulating vegetation on ground newly upturned.

WATER CONSERVATION BY TANKS.

In his first report on the public wells and tanks in New South Wales, the Chief Inspector of Stock states that twenty-eight public tanks, six wells, and two dams were handed over into his charge during the year 1880. These works have been constructed for the use of stock travelling across dry stretches of country, and are stated to have been of the greatest value. In one or two of the wells the water has been found to be unfit for drinking purposes, and it is proposed to deepen the wells with the view of striking, if possible, a better supply. If this is found to be impracticable, the wells will be replaced by tanks. The tanks are constructed to hold on an average from two to three million gallons of water each. Careful observation and experience in the construction of these works have shown that they can be made at comparatively small cost, and on principles which will ensure the rapid storage of the smallest rainfall.

THE PUBLIC HEALTH

DURING DECEMBER 1881.

THE mean temperature of the air during December at the Royal Observatory, Greenwich, was 39°.8, and exceeded the average December temperature in 100 years by 0°.7. The mean showed for the most part an excess during the first seven days of the month, which were followed by a cold period of eight days; an excess of temperature then prevailed during the five days ending the 20th, followed by five days of low temperature ending on Christmas day; the mean was above the average on each of the last six days of the month. Rain was measured at Greenwich on fifteen of the thirty-one days in the month to the aggregate amount of 2.6 inches, which exceeded by 0.6 of an inch the average December rainfall in sixty-one years. The rainfall at Greenwich during the twelve months of 1881 amounted to 25.3 inches, and exactly corresponded with the average yearly amount. The sun was above the horizon during 242.7 hours in December, and 36.1 hours of bright sunshine were recorded at Greenwich, exceeding by 13.4 hours the average amount of bright sunshine in the corresponding months of the four years 1877-80. Excepting only a few days, southerly and south-westerly winds prevailed throughout the month.

In twenty of the largest English towns, dealt with in the Registrar-General's weekly return, 19,512 births and 14,063 deaths were registered during the four weeks ending 31st ult. The births were equal to an annual rate of 33.5 per 1,000 of the aggregate population of the twenty towns, against 33.8 in the corresponding period of last year. The lowest birth-rates in these towns last month were 24.3 and 30.4 in Plymouth and Bradford; while the rates in the other towns ranged upwards to 36.9 in Nottingham and Hull, and 38.1 in Sunderland. The birth-rate was equal to 33.1 in London, while it averaged 33.8 in the nineteen provincial towns.

The annual death-rate in the twenty towns during the four weeks of December averaged 24.1 per 1,000, against 29.9, 29.4, and 20.5 in the corresponding periods of the three years 1878-80. The rate last month, although considerably below the average December death-rate, showed a considerable increase upon the low rates prevailing in recent months. The lowest rate of mortality in these twenty towns during last month was 17.8 in Norwich. The rates in the other towns, ranged in order from the lowest, were as follow: Bristol, 18.4; Plymouth, 19.9; Sunderland, 20.0; Brighton, 20.7; Wolverhampton, 21.3; Portsmouth, 21.7; Newcastle-upon-Tyne, 21.8; Sheffield, 21.9; Bradford, 22.8; London, 23.5; Birmingham, 24.0; Leeds, 24.6; Oldham, 25.6; Nottingham, 25.9; Leicester, 26.3; Salford, 26.5; Manchester, 28.5; Liverpool, 30.1; and, again, the highest rate, 30.2 in Hull. The death-rate last month was equal to 23.5 in London, and to 24.8 in the nineteen provincial towns, which have an estimated aggregate population very little less than that of London. The high death-rates in Liverpool and Hull were mainly due to excessive zymotic fatality.

The 14,063 deaths from all causes in the twenty towns during the four weeks of December included 594 from whooping-cough, 539 from measles, 505 from scarlet fever, 243 from 'fever' (principally enteric), 150 from diphtheria, 134 from diarrhœa, and 111 from small-pox. Thus 2,276, or rather more than 16 per cent. of the deaths from all causes, were referred to the principal zymotic diseases; these were equal to an annual rate of 3.9 per 1,000 in the twenty towns, showing a further increase upon the rates from these diseases in recent months. Whooping-cough and measles were considerably more fatal than they had been in October or November.

The zymotic death-rate last month was equal to 3.9 per 1,000 both in London and in the aggregate of the nineteen provincial towns, among which it ranged from 1.3 and 1.5 in Norwich and Bristol, to 5.3 in Portsmouth and Nottingham, and 11.0 in Hull. The high zymotic death-rate in Portsmouth was due to diphtheria, and in Nottingham and Hull to scarlet fever.

Whooping-cough was the most fatal zymotic disease in the twenty towns during December. The annual death-rate from this disease, which had not exceeded 0.38 and 0.56 per 1,000 in the two preceding months, rose to 1.02 in December; in December 1880 the rate from whooping-cough in these towns did not exceed 0.49. The fatality of whooping-cough last month was considerably greater in London than in the aggregate of the provincial towns, the highest death-rates from this disease occurred, however, in Birmingham, Brighton, and Salford. The death-rate from measles also showed a marked increase during December, and was equal to 0.92, or more than twice the death-rate resulting from this disease in the corresponding month of 1880; the highest death-rates in these towns were 1.1 in Plymouth, 2.5 in Liverpool, and 2.6 in Leeds. The death-rate from scarlet fever, on the other hand, showed a considerable decline from the high rates that prevailed in October and November, and was equal to 0.87 per 1,000. Scarlet fever was twice as fatal in the nineteen provincial towns as in London, and the annual rate during the month was equal to 2.1 in Sunderland, 3.7 in Nottingham, and 9.8 in Hull. Scarlet fever caused 117 more deaths in Hull, making no less than 642 fatal cases that were recorded within the borough during the last six months of 1881; the annual rate, however, which had been equal to 11.1 and 11.3 in October and November, declined to 7.1 in December. 'Fever' (principally enteric), causing 243 deaths in the twenty towns during December, of which 104 occurred in London, and 104 in the nineteen provincial towns; the annual death-rate from the diseases included under this heading, in the twenty towns, which had been equal to 0.54 and 0.53 in the two preceding months, declined

42 in December. The highest death-rates from 'fever' ccurred in Oldham and Bristol. The fatality of diphtheria showed a further increase upon that recorded in ecent months, and was equal to 0.26 per 1,000. The 150 eaths referred to diphtheria in the twenty towns included 4 in London, 43 in Portsmouth, and 8 in Birmingham. he epidemic of diphtheria in Portsmouth showed increased fatality during December, and the deaths recorded om this disease within the borough since the beginning of ie year were raised to 206. During the four weeks of)ecember 111 deaths from small-pox were registered in he twenty towns, and the annual death-rate from this disase showed a further slight increase upon the rates in the wo preceding months. The 111 fatal cases in the month ncluded no fewer than 102 in London; of the remaining fatal cases, 3 occurred in Nottingham, 2 in Salford, and each in Liverpool, Oldham, Hull, and Newcastle-upon-)yne. Judged by the returns from the Metropolitan Asylum Hospitals the prevalence of small-pox in London showed a urther increase during December. The number of small-ox patients under treatment in these hospitals, which had een 453 and 457 on the last Saturdays of the two preceding months, further rose to 485 at the end of December; he latter number included 115 in the Convalescent Hospital at Darenth. The average weekly number of new ases of small-pox admitted to these hospitals, which had een 73 and 82 in October and November, were 78 during December. The largest proportional fatality of small-pox n the Metropolis during last month was again recorded in he south and east groups of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year of age to births, averaged 165 per 1,000 in the twenty towns last month, showing a further increase upon the rates prevailing in the three preceding months; the rate was equal to 157 in London, and averaged 173 in the nineteen provincial towns. This proportion of infant mortality ranged in the provincial towns from 105 and 106 in Norwich and Sunderland, to 205 in Liverpool, 243 in Plymouth, and 261 in Leicester.

The fatality of diseases of the respiratory organs, judged by the Metropolitan returns, showed a further marked increase during December. The average weekly number of deaths referred to these diseases in London, which had been 159, 300, and 374 in the three preceding months, further rose to 443 in December; this number was, however, 97 below the corrected average weekly number in the corresponding months of the last ten years. The annual death-rate from these diseases in the Metropolis, which had increased from 2.2 to 5.1 per 1,000 in the three preceding months, further rose to 6.0 in December. The death-rate from these diseases during last month was equal to 9.4 in Liverpool, and 9.0 in Salford.

During the four weeks of December, the causes of 341 deaths in the twenty towns were not certified either by a registered medical practitioner, or by a coroner. These uncertified deaths were equal to 2.4 per cent. of the total deaths registered, exceeding the proportion that prevailed in recent months. The percentage of uncertified deaths did not exceed 1.3 in London, whereas it averaged 3.5 in the nineteen provincial towns; the causes of all the deaths were duly certified in Plymouth, and the proportion of uncertified deaths was less than 1 per cent in Nottingham and Portsmouth, whereas it ranged upwards to 5.1 in Liverpool, 6.1 in Hull, 6.8 in Oldham, and 7.2 in Salford.

Among the population of little less than a million persons living in the outer ring of suburban districts around London, the annual death-rate from all causes during December was equal to 18.7 per 1,000, showing a further increase upon the low rates that prevailed in recent months. The annual death-rate from the principal zymotic diseases, which had been equal to 2.1 and 2.0 in October and November, further rose to 2.3 in December. The fatal cases of small-pox in the outer ring during the thirteen weeks were 32, showing a further decline from the 89 and 61 recorded in the two preceding quarters of the year. The fatal cases of scarlet fever, however, which had been 72 and 119 in the quarters ending June and September, further rose to 162 in the last three months of the year. The deaths referrred to measles and 'fever' (principally enteric), were also more numerous.

ENGLISH URBAN MORTALITY IN 1881.

In an accompanying table will be found summarised the vital and mortal statistics, issued by the Registrar-General in his fifty-two weekly returns for 1881, relating to twenty of the largest English towns. Monthly summaries of these statistics have already been published in these columns. Both the birth-rate and the death-rate in these towns were lower during last year than in any previous year for which similar statistics are available.

The annual birth-rate in these twenty towns was equal to 35.6 per 1,000 of the estimated aggregate population in the middle of last year, which was rather more than 7½ millions of persons. The birth-rate did not exceed 34.8 in London, while it averaged 36.5 in the nineteen provincial towns. In 1876 the birth-rate in these towns was equal to 38.1, since which it has continuously and steadily declined to 35.6 in 1881. The birth-rates in the nineteen provincial towns ranged from 30.6 and 32.1 in Brighton and Plymouth, to 38.8 and 39.4 in Salford and Sunderland.

The death-rate in the twenty towns last year was equal to 21.7 per 1,000 of the population, and was 1.0 below the rate prevailing in 1880, which was the lowest rate recorded during the sixteen years, 1865-80, during which the Registrar-General has published these urban mortality statistics. The death-rate in London last year was equal to 21.2, while in the nineteen provincial towns it averaged 22.2. The lowest death-rates in these towns were 19.0 in Brighton, and 19.5 both in Norwich and Plymouth; the rates in the other towns ranged upwards to 25.5 in Manchester, and 26.7 in Liverpool.

During last year, 25,482 deaths in these twenty towns were referred to the principal zymotic diseases, equal to nearly 16 per cent. of the deaths from all causes, and to a rate of 3.4 per 1000 of the population; the average zymotic rate during the preceding ten years was 4.3 per 1000. The zymotic death-rate in London last year was equal to 3.6, while in the provincial towns it did not average more than 3.1. Among these towns the lowest zymotic rates during last year were 1.5 and 1.7 in Plymouth and Norwich, while the highest were 4.0 in Nottingham, 4.2 in Leicester, 4.5 in Liverpool, and 6.1 in Hull. The exceptionally high zymotic death-rate in Hull was due to the remarkably fatal epidemic of scarlet fever.

During last year 6023 deaths were referred to diarrhœa, equal to an annual rate of 0.79 per 1000, which, although exceeding the low diarrhœa rates that prevailed in 1877 and 1879, was considerably below the average rate in the ten years, 1871-80. After diarrhœa, scarlet-fever caused a larger number of deaths than any other of the zymotic diseases; the death-rate from scarlet fever was equal to 0.66 per 1000, and was lower than that which prevailed in either of the two previous years, but slightly exceeded the average rate in the ten years 1871-80. The greatest fatality of scarlet-fever during last year occurred in Sunderland, Nottingham, and Hull; the death-rate from this disease was equal to 4.5 per 1000 in Hull during the entire year, a greater fatality than has been recorded in any one of these twenty towns during the past twelve years, with the solitary exception of a remarkable epidemic in Oldham in 1872, when the rate was equal to 6.1 per 1000. The 4318 deaths from whooping-cough during last year in the twenty towns was equal to an annual rate of 0.57, which was lower than the rate in any of the ten preceding years, during which the mean rate was 0.76; the greatest fatality of whooping-cough during last year was recorded in Sheffield, Salford, and Birmingham. The fatality of measles, however, was slightly above the average, and was equal to 0.55 per 1000; the death-rate from this disease was higher in London than the mean rate in the provincial towns; but the greatest proportional fatality occurred in Sheffield and Liverpool. The death-rate from 'fever' (principally enteric) in the twenty towns last year corresponded with that in 1880. The rate steadily declined from 0.88 to 0.29 per

1000 in the ten years 1870-79, but rose again to 0.38 in 1880, and was so maintained in 1881. The 'fever' death-rate in London scarcely differed from the mean rate in the nineteen provincial towns; compared with recent years, however, the rate in London had increased, while that in the provincial towns had further declined. The highest death-rates from 'fever' were recorded last year in Portsmouth and Liverpool. The 1160 deaths attributed to diphtheria considerably exceeded the numbers returned in recent years, and were equal to an annual rate of 0.16 per

provincial towns. The lowest rates of infant mortali the provincial towns last year were 119 in Portsmouth, in Bristol, and 127 in Brighton; the rates in the towns ranged upwards to 167 in Leeds, 169 in Nottingl 173 in Liverpool, and 202 in Leicester. The ma excess of infant mortality in Leicester was only partly d the usual summer fatality of infantile diarrhœa.

In conclusion, it may be worth notice that, unles returns for the remainder of the population of Eng and Wales show an exception to the very constant rela

Analysis of the Vital and Mortal Statistics of the Twenty Large English Towns dealt with in the Registrar-General's Weekly Returns for 1881.

Towns.	Estimated Population in middle of 1881.	Births.	Deaths.	Annual rate per 1000 living. Births.	Deaths.	Principal Zymotic Diseases.	Deaths from Principal Zymotic Diseases.	Small pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping-Cough.	Fever.	Diarrhœa.	Rate per cent. of Uncertified Deaths.	Deaths of Children
20 Towns	7,608,775	270,040	164,854	35.6	21.7	3.4	25,482	2463	4179	5017	1106	4318	2376	6023	2.3	15
19 Towns	3,779,024	137,366	83,783	36.5	22.2	3.1	11,671	92	1646	2909	452	2357	1180	3035	3.4	19
London	3,829,751	132,674	81,071	34.8	21.2	3.6	13,811	2371	2533	2108	654	1961	1196	2988	1.3	14
Brighton	107,934	3,287	2,048	30.6	19.0	2.2	234	9	20	75	5	33	43	49	2.0	17
Portsmouth	128,335	4,392	2,515	34.4	19.7	3.4	438	..	8	25	206	66	60	73	0.6	19
Norwich	88,038	2,950	1,707	33.6	19.5	1.7	148	1	12	64	2	1	16	52	2.8	14
Plymouth	75,262	2,407	1,463	32.1	19.5	1.5	111	2	19	4	7	34	19	26	1.5	13
Bristol	207,140	7,140	4,054	34.6	19.6	2.3	474	..	118	154	13	39	60	90	2.7	13
Wolverhampton ..	75,934	2,721	1,604	36.0	21.2	2.2	166	..	2	56	4	44	12	48	5.3	14
Birmingham	402,296	14,908	8,009	37.2	20.0	2.7	1,091	6	119	165	55	361	55	330	1.5	13
Leicester	123,120	4,711	2,678	38.4	21.8	4.2	510	..	7	152	10	120	32	189	1.8	20
Nottingham	188,035	6,871	4,193	36.7	22.4	4.0	755	4	34	353	7	94	61	202	1.1	16
Liverpool	553,988	20,762	14,733	37.6	26.7	4.5	2,477	34	756	435	50	402	292	508	4.0	17
Manchester	341,269	12,549	8,664	36.9	25.5	2.3	790	3	115	96	14	239	78	245	2.4	12
Salford	177,760	6,880	4,008	38.8	22.6	2.9	516	7	38	84	20	156	56	153	5.4	16
Oldham	112,176	3,957	2,548	35.4	22.8	2.3	256	9	8	84	10	34	40	71	6.3	13
Bradford	184,037	6,058	3,612	33.0	19.7	2.0	363	2	13	119	9	108	29	83	3.9	13
Leeds	310,490	11,379	6,675	36.8	21.6	2.9	908	2	126	77	11	262	109	321	4.0	16
Sheffield	285,621	10,820	5,993	38.0	21.1	2.7	782	..	204	77	10	214	63	214	4.9	13
Hull	155,161	5,634	3,677	36.4	23.8	6.1	950	4	8	696	5	37	61	139	5.3	14
Sunderland	116,753	4,587	2,439	39.4	21.0	2.7	320	..	3	143	8	45	30	91	4.0	16
Newcastle-on-Tyne	145,675	5,347	3,163	36.8	21.8	2.6	382	9	36	50	6	66	64	151	3.4	13

1000; 654 were recorded in London, and not more than 452 in the provincial towns. An exceptionally severe epidemic of diphtheria prevailed throughout the year in Portsmouth, causing 206 deaths, which were equal to a rate of 1.63 per 1000; this was more than ten times greater than the average rate from this disease in the twenty towns. The fatal cases of small-pox in these towns, which had been but 461 and 485 in the two preceding years, rose to 2463 in 1881, of which 2371 occurred in London, and only 92 in the nineteen provincial towns, having an aggregate population very nearly equal to that of London. Of the 92 fatal cases in the provincial towns, 34 occurred in Liverpool, 9 in Brighton, 9 in Oldham, 9 in Newcastle-upon-Tyne, and 7 in Salford. The fatality of small-pox in London showed the greatest excess in May, after which it steadily declined until the end of October, but was again slightly higher in November and December. The number of small-pox patients under treatment at the Metropolitan Asylums' hospitals rose steadily from 440 at the beginning of the year to 1552 at the end of May, after which the numbers steadily declined to 453 at the end of October; at the end of December, the number under treatment was 485.

During last year the causes of 3862, or 2.3 per cent., of the deaths in the twenty towns, were not certified, either by a registered medical practitioner or by a coroner; the proportion of uncertified deaths did not exceed 1.3 per cent. in London, whereas it averaged 3.4 in the provincial towns. The percentage of these uncertified deaths was so low as 0.6 and 1.1 in Portsmouth and Nottingham, but ranged upwards to 5.3 in Wolverhampton and Hull, 5.4 in Salford, and 6.3 in Oldham.

Infant mortality, measured by the proportion of deaths under one year of age to births registered, averaged 152 per 1000 in the twenty towns last year; in London the proportion did not exceed 148, while it averaged 156 in the

which they bear to the returns for the twenty large towns, the death-rate for the whole of England and Wales during 1881 was lower than that recorded in any previous year since civil registration was established in 1837.

The Metropolitan Board have decided to enlarge the reservoirs connected with the main drainage outfalls at Barking and Crossness, at an estimated cost of £160,000. The Barking reservoir, which covers about 9 acres and a half entirely closed in, is to be enlarged by an additional 5 acres, and the Crossness reservoir, with a present closed area of about 6 acres and a half, will be enlarged to the extent of 3 acres. This decision of the Board will, it is thought, meet the objections urged as to the polluted state of the Thames in the neighbourhood of Greenwich and Woolwich. The Board have decided to retain two eminent engineers, as witnesses for their defence should the Home Secretary order an official inquiry into the state of the river in relation to the outfalls.

THE EMPLOYMENT OF CHILDREN IN RUSSIA.—The Russsian journals publish details of the new projected law relative to the employment of children in manufactories throughout the empire. The minimum age is fixed at 12 years, but children already employed in such establishments are excepted from the benefits of this regulation. Up to 18 years of age the day's labour is not to exceed 12 hours, inclusive of two hours devoted to rest and meals. Night work is absolutely forbidden.

The Hindley (Lancashire) Local Board have awarded the premium (£60) for a sewerage scheme and estimate to the set of designs bearing the motto 'Health', the authors of which are Messrs. Nuttall, of Bury. The scheme embodies filtration, with precipitation if necessary. The Board, by the conditions of the competition, are not bound to carry out the premiated scheme.

SPECIAL REPORTS.

OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

of this Society was held on Friday, December V. TRIPE, President, in the Chair. A report uncil was brought up, recommending the ition the Local Government Board to cause the medical inspectors on local outbreaks of in future printed as Parliamentary Papers, or made available for those who may desire to n. The Council also recommended the nd a copy of this resolution to the North ociation of Medical Officers of Health, who that the Society should co-operate with them that the reports of the Medical Officer to the ment Board, should be sent to all Medical alth, whose appointments had been sanctioned

MMISSION ON HOSPITAL ACCOMMODATION OUS DISEASE.—The Council also presented the subjects referred to the Royal Com- inted to consider the hospital accommo- e Metropolis for infectious disease. The d much discussion, it being felt by some t it was not advisable the Society should p in the matter. Eventually, it was re- he Society should express its views to the and the report of the Council was then con- er further discussion, it was resolved not to e to any existing small-pox hospital, seeing ere the subject of litigation, and it was also o express an opinion on the limits of extension from a small-pox hospital, this question still ce. The following report was then adopted :—

ey are of opinion that the available accom- small-pox patients is insufficient to meet the ch might at any moment be made upon it, scence of the existing epidemic. So far as umber of beds available for the treatment of e existing accommodation appears to be fairly present wants. The hospitals, however, are , and therefore necessarily remote from many etropolis.

ntage of a limited number of hospitals for the polis, and under one central Authority, pre- The Authority should make provision for all sons, and admission to the hospital should not sation. Provision for mild cases of small-pox valescent cases, should be made outside the If this were done, probably eight well-placed taining 150 beds each, would suffice for the es that must be treated in hospitals within the e., cases, too ill to be removed to any great n their homes; and no small-pox hospital n more than 150 cases at any one time. To for fever and for small-pox cases, a district cated, and only overflow cases, in emergencies, moved to any other hospital than that of the rly assigned to such hospitals. The adoption iple would obviate many objections to the n of hospital accommodation. The Hospital uld have the power to acquire sites for hos- orily; and subject to the hospitals being con- reasonable care, and according to prescribed ne Authority should be protected from legal so as to secure the public against loss of the ng from such institutions. The Society wish he Royal Commission the necessity of legisla- :—(1) Compulsory notification of infectious Compulsory powers to enable the Sanitary nforce the removal to hospital of the infective essed of lodging or accommodation, enabling operly treated and isolated.'

TITUTION OF A SANITARY STAFF IN LARGE TOWNS.—Dr. SEATON, of Nottingham, called attention to an advertisement which had recently appeared in the papers, concerning the appointment of a Medical Officer of Health to Sunderland. The advertisement stated, that the successful candidate would have to undertake the same duties as his predecessor, Dr. Yeld. Dr. SEATON raised objections to a Medical Officer of Health undertaking other duties than those which properly belonged to his office. Dr. Yeld had performed for Sunderland the duties of 'chief scavenger'; he had the supervision of eighty scavengers, a number of horses, and he had to buy the provender, and sell the manure. Dr. SEATON felt that these duties were very foreign to those which any Medical Officer of Health ought to undertake, and he briefly enumerated other duties which were expected of this Officer in other towns, among them being the superintendence of hospitals for infectious diseases, the treatment of the patients in the wards, and the prosecution in police courts of offenders against the Public Health Acts. In the latter capacity, it would sometimes happen that he would be placed in the anomalous position of prosecutor and witness in the same case.

In large towns having 18,000 inhabitants or more, there should be an independent officer in connection with the scavenging department, who should be paid about £200 a year, and who should have a foreman who was paid £100. The Medical Officer of Health should be in a position to criticise this department, and should not therefore be an officer of it. For the inspection of houses, there should be a chief sanitary inspector, who should have knowledge of house construction, in addition to inspectors under his control. There should also be separate officers for the inspection of lodging-houses, and for the management of disinfecting stations, reporting direct to the Local Authority. The Medical Officer of Health would find his time sufficiently occupied by work in relation to epidemic diseases, by the preparation of statistical information for the purposes of the Artizans' Dwellings Act, and by the preparation of his annual report, besides this work, one of his most important duties is to be an educator of public opinion. He would find that by confining himself to work of the character mentioned, he would be better able to criticise on duties which should devolve upon other officers, than if he himself were responsible for their proper performance.

Mr. JACOB suggested that the Society should send to the Town Council of Sunderland an expression of opinion that the duties of 'chief scavenger' should not devolve upon the Medical Officer of Health.

Mr. WYNTER BLYTH thought it would be better to call the attention of the Local Government Board to the matter.

After further discussion, on the motion of Dr. DUDFIELD, seconded by Mr. ARMSTRONG, it was resolved, that the subject should be referred to the Council for consideration and report.

The results of inquiries lately made by Mr. S. J. Smith, an engineering inspector of the Local Government Board, into the state of the water-supply of Exeter, is anything but satisfactory. Coming from a dirty source, it is said to be as repulsive to the eye as it is offensive to the smell and palate, and can hardly fail to be detrimental to health. It is reported to vary considerably in appearance, being at times of a pink aspect; at others, to assume a green and pea-soupy appearance. Mussels, eels, small fishes, and leeches are said to form a part of its constituents. If anything were necessary to persuade the Corporation to give up a water-supply so highly charged with deleterious substances, it surely can be found in this report of the Local Government Board.

The Corporation of Dublin have declared the Labouring Classes' Lodging Houses and Dwellings Act, 1866, in operation in Dublin. This Act gives the Corporation power to build dwellings for the labouring classes, and to borrow money from the Board of Works for that purpose. Dr. Cameron, the Superintendent Medical Officer of Health, suggests that not less than £50,000 should, in the first instance, be obtained as a loan under the provisions of the Act.

SMOKE ABATEMENT EXHIBITION

AT SOUTH KENSINGTON.

(*Continued from page 260*).

DOMESTIC GRATES, STOVES, AND KITCHEN RANGES.

The 'Griffin' Open Grate, the patent of Mr. Robert H. Griffin of Guildford Street, Russell Square, W., combines ventilation with the power of consuming a considerable portion of its smoke, and will burn coke, anthracite or bituminous coal with equal freedom. Although comparatively new, it has already obtained, in the space of a few months, the highest award at two sanitary exhibitions at which it has been shown. The principle of smoke consumption is carried out by the constant discharge of jets of superheated air amongst the products of combustion, raising

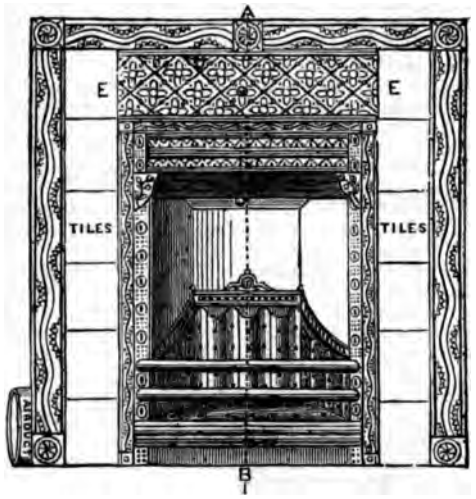


Fig. 1.

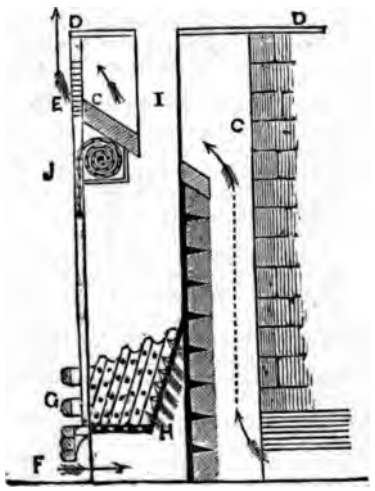
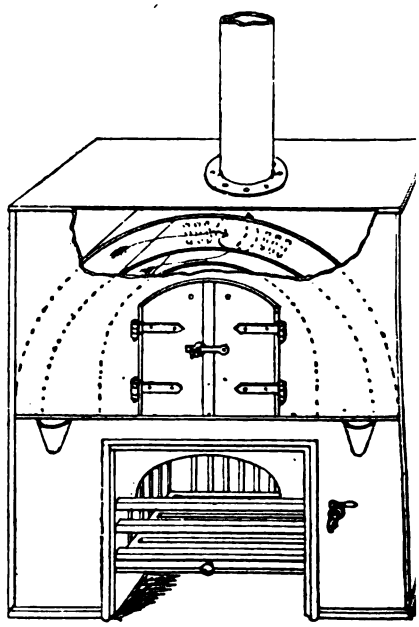


Fig. 2.

them at once to the temperature necessary for their ignition and conversion into flame, and, consequently, heat. It is also claimed that this stove is a perfect cure for a smoky chimney. Ventilation is provided for by the admission of the external atmosphere, which can be regulat off at night. This air is superheated, and can to the apartment as desired, and it is a very c feature of this grate, which we have seen de that in a large apartment the temperature farthest from the fire scarcely varies from th mediate vicinity of the stove. It can also be a very moderate price, and in the now preval decoration. The accompanying engravings, i section and elevation, and the description, wi reader to form a correct idea of its entire a Fig. 1 is the front elevation; fig. 2 is the ver on the line AB. An air-chamber, C, is formed in the whole of the recess behind the grate plate D, fresh air is introduced into it, beco (the arrows denoting the direction of the c then delivered through the ventilator E, rises t traverses the extreme end of the room, ther gradually to the fire at F and G, and passes i air-chamber behind it, when it becomes superl delivered in jets around, in, and over the fire, c it the products of combustion through the pi chimney. The ventilator E is made so as to air admitted, and for the purpose of closing it retain the heat in the apartment. A coiled blo vided to facilitate the lighting of the fire, and a consume the smoke when the fire is replenish same means the very great difficulty of lightin expeditiously and thoroughly, and in getting perature of a room quickly, is entirely overcome. back, and cover over the fire are formed of iron, projecting, which are filled in with fire cement.

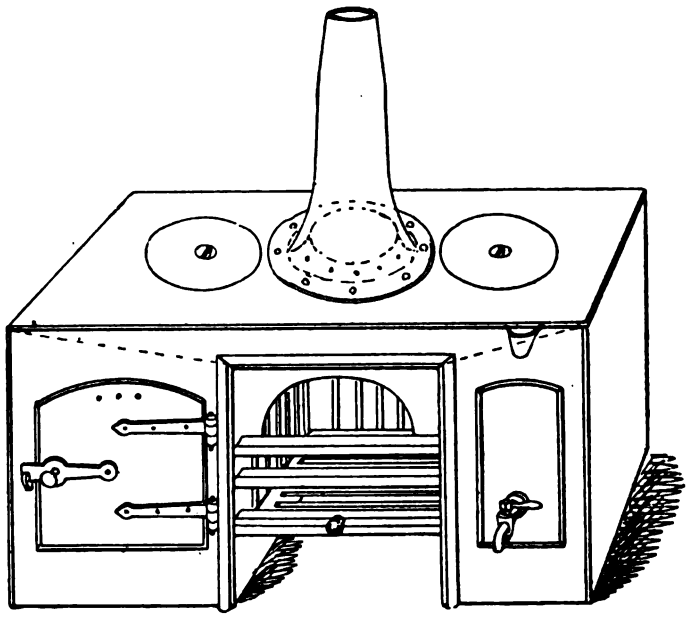
The Westminster stoves (Westmacott's patent in connection with the patents, by Mr. C. J. Bridge St., Westminster, while applicable to and cooking purposes, are especially designe patentee, in one form, as an artisan's stove, o



large class who reside in apartments; the con the grates being such that they not only provi fire, but a good sized oven for general cookin and a boiler. A great amount of heat is giv good combustion, with the consumption of a la of the smoke, is also obtained. On this point t the inventor is original. He bases his theory o ciple of some of the older kinds of oil lamps; fi the 'solar', which carried a glass chimney o shape, and his outlet flue is formed after the patt

e maintains gives him an advantage in the combus-
his gases not obtained in a straight pipe. The top
grate forms the usual hot-plate for boiling and
, the open fire is large enough to roast by, and the
so constructed that it cannot burst, as it is never
ıct with the fire, an independent chamber being
ıround it to prevent this objection. It can also be
into a slow combustion stove by an arrangement
nables the bottom bars of the grate to be entirely
. So far we have been speaking of the 'apartment'
'hich appears to us to be admirably adapted for its
, and can be produced at a very small cost. We
ected this for illustration, and also another in the
an ordinary kitchen-range, made in small sizes,
to 36 inches, adapted for cottagers' use or small
ı houses. The main remarks made on the 'Apart-

Messrs. Clark, Bunnett, and Co., of 30, Queen Street, E.C., have specimens of Ingram's Patent Karo-Kaipnos Stoves and Ranges, of which they are sole manufacturers. The bottom and back of this grate is a fire-clay lump. At about the middle of the fire, or at that height where the coals are universally red-hot, the flue starts and is carried under the bottom, and so up behind into the chimney; by this means the products of combustion, instead of rising as they usually do in volumes of smoke from the top of fire, descend through it and are consequently consumed, whether the fuel used be coke, anthracite, or common coal. If desired, the grate can be used as an ordinary slow combustion with smoke ascending in the ordinary way, by simply moving a knob communicatiug with a damper fitted in the flue for that purpose. It is also made with a warm air chamber for receiving the external air; in this case it is



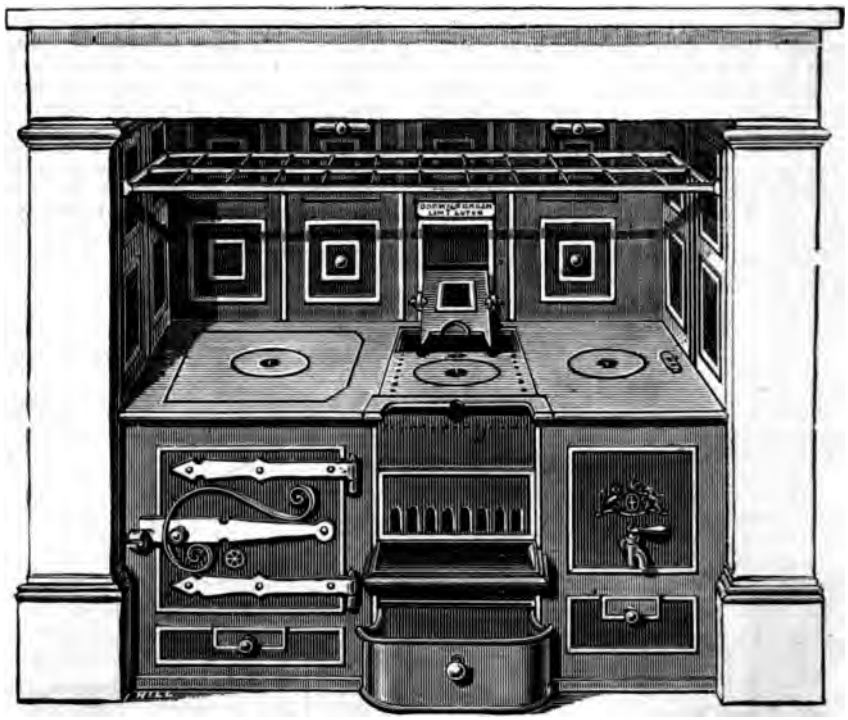
›ve apply to this also. Mr. Westmacott also pro-
/eral other modifications of his system, and adapts
ciple of producing improved combustion to grates
›tion rooms, and to apparatus for heating schools,
ı, and other large buildings. This he effects by
fresh air in from the outside, and storing it in a
ıamber directly over the fire, from whence he
t as required. There are points in the construction
Westminster stoves that are highly commendable.

s. Marshall, Watson, and Morwood, of the
›n Works, Sheffield, have a select show of their
›wn 'Harleston' Warm-Air Grates, but the spe-
xhibited by this firm is a smoke-consuming grate
patented by them. An important feature in the
tion of it consists in the arrangement of the bars,
›m and front being made in one, so that the latter
st in a vertical position, the space between them
hat greater than is usually allowed in bottom bars,
:he front it is less than in the case of the ordinary
l ones; by this means even currents are distributed
ıt the fire, causing a more perfect combustion.
, back, and top are composed of fire-clay lumps,
perture leading to the flue, instead of being at the
n the front, immediately above the bars, but is
r the ornamental cast front, which is sufficiently
ıt purpose; the result of this plan is that whatever
e from the burning coal impinge against the hot
›p, and are for the most part consumed, leaving
›n to ascend into the chimney.

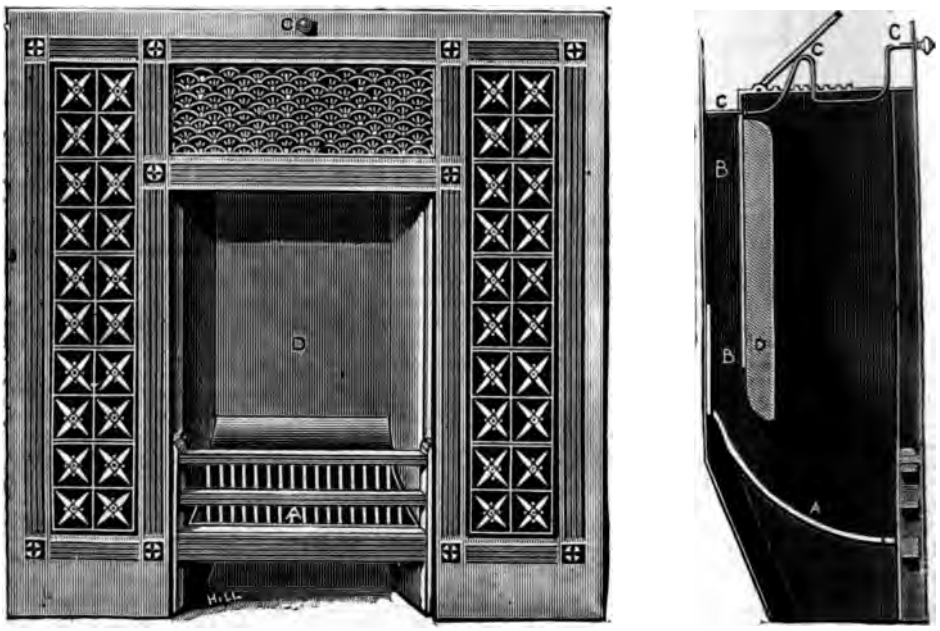
fitted with gills, so that it becomes thoroughly warmed before being admitted into the room. It is not necessary to go into the details of the ranges, which are constructed on similar lines, and appear effectively to do what is claimed for them.

We now illustrate the 'Luton' Patent Smoke-Consuming Kitchener, and the 'Luton' Smoke-Consuming Register Stove, manufactured by Messrs. Brown and Green, Limited, of Luton, Beds., and 72, Bishopsgate Street, Within, E.C., to which we called attention, in our description of the exhibits at South Kensington, in the last number of the SANITARY RECORD. The Luton Kitchener, it will be observed, differs but little in general appearance from an ordinary close range, excepting that the bars are vertical, flat, and rather short, and that an open tray or box is attached to the front, into which the fuel is placed, and is pushed forward into the fire through a horizontal opening, provided for that purpose below the bars, by means of a hoe-shaped feeder. This is one of the simplest arrangement for bottom feeding that has yet appeared, and its advantages are unmistakably apparent. It will be readily seen that nearly all the gases evolved in the process of disintegration of the fuel must pass through the mass of red-hot coal and be consumed ere they can escape, thus materially economising fuel, and utilising all that portion of the heat that, under ordinary circumstances, passes up the chimney to waste in the usual form of smoke. By these means red-hot coal is always on the top, and we certainly appear to have made great progress towards the consumption of smoke in

this invention. A number of small holes are provided near the top of the fall-down front plate, and in the sliding plate over the top of the fire, through which a current of air enters, and impinges upon and ignites any inflammable gases that may escape from the fire. This kitchener also regards waste of fuel, the Luton is provided with an means of arresting this waste. A self-acting damp fitted to the back of the fire, and a sliding plate ov top of the fire. When this plate is pushed back for gri etc., it opens the damper, and the products of comb



THE 'LUTON' PATENT SMOKE-CONSUMING KITCHENER.



THE 'LUTON' SMOKE-CONSUMING REGISTER STOVE.

burns anthracite coal or coke, and in this case it is fed in the usual manner from the top, but as it is generally admitted that kitchen ranges are the greatest culprits as pass direct to the chimney, and when the plate is pu forward again over the fire the damper closes, and the passes round the oven and boiler. As the heat is

sequently usually centred around the range, and giving off its warmth into the kitchen, there is not the inducement to be constantly putting on fresh coal, as it is not burning away with the same rapidity as when it is going up the chimney in a half-consumed state. The Luton smoke-consuming register, of which an engraving is also appended, is arranged to burn either anthracite, coke, or bituminous coal; in the latter case the smoke being mainly consumed. It is provided with a double draught, consisting of a damper, and the ordinary register door. When the damper is opened the register door is closed, with the exception of just sufficient space for ventilation, and when the damper is closed, the register door is opened to its full width. The bottom grate rises at the back, increasing the area of the open bar space for the admission of air to the fuel. The flue is at the back of the fire, its narrow mouth being close to the top of the fuel, and it has a protecting fire-brick in front. By the means described perfect control over the fire is obtained, the movement of the damper causing it to burn freely or slowly at will, and the quantity of smoke evolved is but a small percentage. We shall, on a future occasion, illustrate the firm's new smoke-consuming 'Kensington' grate.

At the stand of Mr. T. J. Constantine, 61, Fleet Street, E.C., is to be seen a very complete assortment of smoke-consuming cooking ranges and warming stoves. These have been before the public for some time under the name of the 'Treasure', which is by no means an unappropriate appellation. The exhibit comprises cooking ranges in a number of sizes, from the 'Artizan's' or 'Cottager's', standing only 2 feet high and 18 inches wide, to those with

double ovens and boiler capable of cooking for fifty persons. The special features of these 'Treasures' are their compact form and the arrangement of the flues, an exhaustive description of them having been given in our Report upon the Medical and Sanitary Exhibition a few months ago. One point, however, then escaped our notice: this consists of a simple arrangement for sifting the ashes as they fall from the bottom of the grate. The small portion of cinders made are then thrown on the fire, where they are burnt, thus preventing any waste. The display of warming stoves and slow combustion stoves for halls, etc., is equally varied, several of them being newly registered designs, which for price and quality, we think, are not surpassed. We append an engraving of the 'Treasure' range suitable for family use, which it will be seen is most compact in all its arrangements.

Mr. J. Dunnachie, of the Star Fire-Clay Works, Glenboig, has a single exhibit of a new patent close stove, named the 'Star' Heating Stove. The main feature sought to be illustrated is the great power of fire-clay as a heating medium, cast iron being only employed as an outer casing for the purposes of binding together and for ornamentation. It is square in form, the design is good, and is of open ornamental work, through which the fire-clay is seen and the heat radiated. The clay employed is the celebrated 'Glenboig', which is well known to possess great resisting power against cracking, and of which it is even said that if cold water were thrown upon it when highly heated, it would not injure it. The stove burns coal, coke, or any inferior fuel, but anthracite burns freely in it, and consequently without smoke. As it has only recently been perfected, we have not many data to rely on as to its capabilities besides our own judgment. But the inventor informs us that experiments made with it for twenty-four hours, in a room, 24 feet by 16 feet, gave a temperature never below 65 degrees Fahr. from the time it was well alight. The quantity of fuel required for that length of time varies from 14 to 28 lbs., according to the amount of heat required, or the rate at which it is worked, for it is capable of being adjusted to the greatest nicety. It is, we are informed, intended to introduce it as a smoke-consuming stove.

The appliance for preventing smoke in sitting-room grates by feeding from the bottom, shown by Mr. R. Holland of Newington Green, N., is undoubtedly original, and can scarcely fail to be much used; it being so simple that once being known it must be appreciated. It differs from an ordinary register only in having a lever fitted to one side, which, being well finished, in no way detracts from the appearance of the stove. To replenish the fire it is necessary to draw this lever forward, which may be done without the least exertion by a lady or a child; this action introduces a set of prongs between the apertures in the bottom, and lifts the fire *en masse*, together with the front bars, a height of, say, three or four inches; fresh coals are then inserted, and the lever pushed back into its place, the prongs simultaneously receding in a horizontal direction, while the bars drop into their normal position.

The Smoke-Consuming and Slow-Combustion Grate exhibited by Mr. F. E. Edwards, of Great Marlborough Street, is worthy of note, being constructed on the principle adopted by the late Dr. Arnott, and also resembling in some particulars a grate patented by Mr. Goodchild, an architect of Guildford, in 1857, it, however, embodies substantial improvements on both methods. Mr. Edwards adopts the principle of putting sufficient coals for a day's or a night's

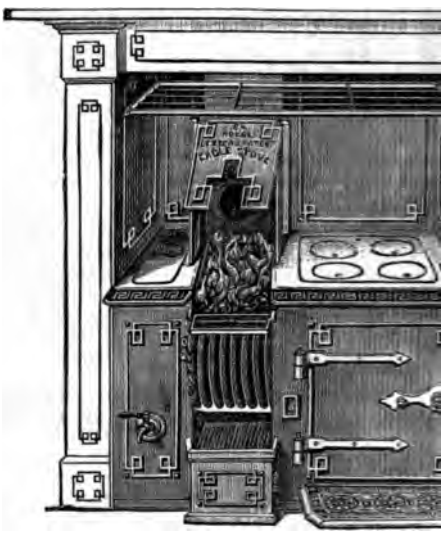
consumption into a fire-basket or chamber, making a fire on the top of the body of coals, and allowing the fire to burn gradually downwards till the whole is consumed; and instead of machinery to lift the basket of coals as it burns down, what may be called a blind is used to move down by degrees in front of the body of burning fuel. A wire basket is fitted in front of the grate which catches all the coal that falls, and allows the dust to fall through it into a trough out of sight, the cinders being used for next day's consumption. Arrangement is also made for admitting, where desired, the external air, which is conveyed over the back of the stove and diffused into the apartment through a grating at top, at a temperature of from 90° to 120°.

The 'Tortoise' Slow Combustion Stoves of Messrs. Portway and Son, Halstead, Essex, are shown in a variety of sizes, patterns, etc. They are admirably adapted for all the purposes to which an independent heating stove can be applied, are made of the smallest sizes suitable for harness rooms, small workshops, etc., of a larger and more ornamental character for halls, and of a still larger size for churches, public buildings, etc. They are also made with boilers for heating ranges of hot water pipe for conservatories or other purposes. From their slow combustion character and great economy of fuel, they are admirably adapted for keeping alight during the winter, for the supplementary heating of houses. Our engraving depicts one fitted with tiles. Although made of iron, they are lined throughout with Stourbridge fire-clay, and this material can be renewed

from time to time, as it wears away, without disturbing the stove. They will burn coke, cinders, or any refuse; and experiments made with anthracite coal during the past year show that the 'stone' fuel is as well adapted to it as any other. The following table is interesting, as showing the cost of anthracite in these stoves, the No. 1 having a heating power of 2,000 cubic feet, and the No. 6 of 40,000.

No.	Consumed Anthracite Coal.	Hours Burning	Replenished every	Consumed each 24 hours.	At cost per 24 hours.
1	112lbs.	170	7 hours.	15¾lbs.	2½d.
2	112lbs.	140	10 ,,	20 lbs.	3d.
3	112lbs.	100	12 ,,	28 lbs.	3½d.
4	112lbs.	84	18 ,,	33 lbs.	4½d.
5	112lbs.	56	24 ,,	48 lbs.	6d.
6	112lbs.	36	30 ,,	70 lbs.	9d.

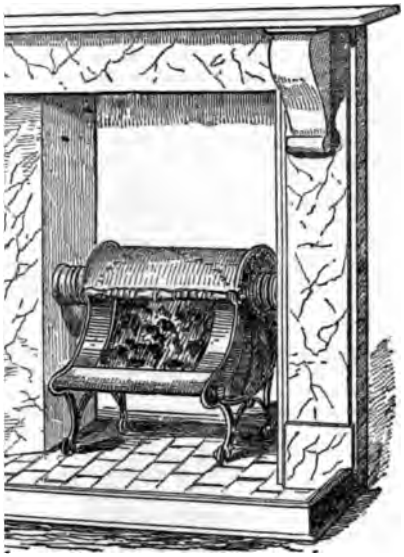
The Eagle Range Company, of Fleet Street, E.C., and Birmingham, exhibit the kitchen range bearing that name. These ranges are made in a variety of sizes and forms to suit the requirements of different districts, and all are complete in themselves, requiring no brickwork setting. One pattern is made for burning wood, and intended for colonial use; others for either wood or coal; a third set are designed on the American principle, standing on legs, with the addition of the various features comprising the company's improvements, amongst which may be mentioned a complete open or close fire, while a fourth is made of the complete kitchener pattern, with enclosed top, covings, plate rack, etc. The points in which the Eagle kitchener differs from most others are numerous, and the appended drawing enable a good idea to be formed of their specialities. An excellent feature appertaining that they are made with iron flues of the m sizes, according to the dimensions of the r secures more effectual working, as the building is not left to the chance ideas of the bricklayer. the case that the best constructed ranges are some extent ineffectual from the flues being improper sizes, added to which, through the co expansion of the iron in connection with the often occurs and the draught is spoilt. The used open or closed as desired, and they are pr an adjustable fire-box, a feature now considere good reason, to be of considerable importance to

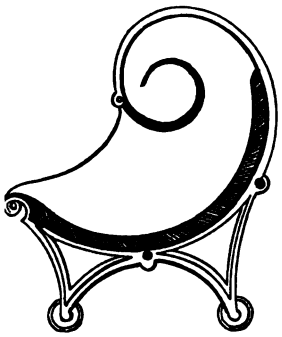


The fire-bars are vertical and convex in their form, this shape facilitating the raising of the grating to reduce the fire. When first preparing heating ovens, it is necessary that it should be m large, but when they are fairly heated a much sm will suffice to keep them so if in the right In the Eagle range the bottom grating can b diately raised by means of the kitchen poker, ta fire with it direct to the hot plate. This not only economy in fuel, but produces most satisfactory in cooking. The ovens have two flues, one direct from the fire over the top, the other to the By this means the heat is equalised, but should cess of it be required at either top or bottom, it instantly applied by turning the handle of a re valve, which sends it in any direction required. other little *minutiæ* attaching to a kitchen range ha well provided for, such as ventilation of ovens, arra for cleaning flues, etc., and the heat in passing ro ovens by means of the two flues secures more perfe bustion, and tends materially to minimise smoke. gether, the Eagle range is one well worth the atte economists and those who wish to secure a good apparatus. The company also exhibit some grilling stoves, suitable for restaurants, club-houses,

One of the most recent and interesting additio exhibition in the form of an open fire-grate, 'Nautilus' grate, recently patented and exhibited James B. Petter of Yeovil, the inventor. So fa slight acquaintance with it can be relied on, w favourably of it, on account of its moderate co nomy of fuel, and its smoke-consuming arrangement name implies, it is as near the exact shape of a shell with elongated sides as is consistent with its for a grate; the appended engraving shows its form. It stands on legs, and appertains to the of a 'Dog' grate, in so far that it is an independe and is placed in an ordinary opening; but here its

grate ends. It is fed at the front, the fuel long the front or lip, the smoke and heated pass over the fire into the centre or axis of in reality forms a combustion chamber, and





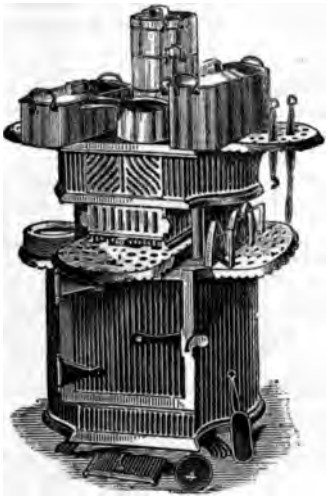
s them into flame, the residue passing into ues, which are carried up behind the recess ey. By this arrangement the main bulk of ated by the fire is retained and given off into , both by the fire itself, and by the curled ng the axis of the shell. At the same time, ring the room that is drawn to the fire-place nd the stove, and is being constantly emitted ment in a warmed condition. Thus, loss of d, and it is claimed that a given area may be use of this grate with considerably less fuel, other. It is lined with firebrick, which, ing, secures slow combustion, but a bright less secured. Ashes or dust do not fall upon ing to the peculiar shape of the stove, and t arrangements of a not unsightly character r carrying the side flues out of the apartment, may be used in rooms where there is no

Poore and Co., 155, Cheapside, E.C., have ment of their Anglo-American Base Burner l Anthracite Stoves for heating and cooking, arned a justly widespread reputation; also nd asbestos stoves, of good design, at very es.

ith and Wellstead, of Ludgate Circus, have a n of their Anglo-American and other cooking arious hall and sitting-room stoves, suitable ther anthracite or ordinary bituminous coals.

Mr. H. Thompson, 60, Essex Road, Islington, exhibits an apparatus for the prevention of smoke in domestic fire-places upon the principle of replenishing from underneath, so that all smoke, having to pass through the live coals, is for the most part consumed. It is simple enough, and consists of a wrought iron plate, hinged to which is a lever, the action being to insert the plate under the fire, and by means of the lever raise it and the bars to admit of the coal being put on, but as the bars must necessarily work easily up and down, it is only applicable to grates so constructed.

Messrs. Chorlton and Dugdale, Blackfriars Street, Manchester, exhibit their popular 'Sunlight' cooking stove and utensils. We have so often adverted to this admirable apparatus for the kitchen, that we cannot further enlarge upon its merits; it is sufficient to say that it accomplishes more for its size than any range we are acquainted with, it occupies less space than many others that will not effect nearly so much work, and requires no setting. The special cooking utensils for the 'Sunlight' stove are not the least commendable feature in its arrangements. This firm also exhibit Prince's Heat Diffuser, a new appliance heated by gas for disseminating warm pure heated air, with or without moisture, through the house or a single apartment, according to the spot it may be fixed in. Its



interior contains several convoluted chambers filled with water, and the fresh air is admitted from the outside, and warmed in its passage through the 'Diffuser' in the usual manner. The products are carried off by a pipe to the nearest outlet, rendering it perfectly free from smell. It will be observed that from its shape the warm air is admitted to the room in horizontal directions, instead of rising in a column as in most heating apparatus; and it is so arranged that the heated water can be sent forth into the room in the form of steam, and can be regulated to any required degree, rendering it invaluable in a sick room in all bronchial or pulmonary affections. This appliance is one of the newest in the Exhibition, and is well worthy of attention.

Messrs. Rosser and Russell, Charing Cross, exhibit a variety of heating and warming apparatus of their usual widely known construction. They show, in addition, a handsome cooking range of large dimensions, fitted with the latest improvements, including arrangements for raising the fire to the hot plate, when only a small one is required, and for perfect ventilation of the ovens; one of which is large enough to roast a haunch of venison. The greatest novelty in the exhibit is the 'Leopold' Reversible Grate, which appears to effect a large consumption of smoke. Many of the objections as regards form, mechanism, etc., attendant upon the feeding of a grate from the bottom, are here overcome by putting the fuel on the top, and by the action

of the poker turning the uppermost part of the grate to the bottom. The arrangement is as follows:—The fire is contained in a basket of any suitable form, supported on a central pivot at the back, on which it revolves. The fire basket is fitted, not only with a bottom grating but also one at top, so constructed, that whichever grating is uppermost can be turned up on a hinge. In first making the fire, the fuel should be laid for lighting at the top and allowed to burn down, unless a good fire is required quickly, then it may be lighted in the ordinary way. When the fire wants replenishing, fresh coal is thrown on the top of the fire in the usual manner, the top grating shut down, and by a turn with the poker the fire is reversed, thus bringing the red-hot coal to the top with the fresh fuel underneath, the smoke and gas evolved from the new coal underneath, in the bottom of the grate, having to ascend through the incandescent fuel is ignited, and its combustion effected. By the coal burning downwards, not only does it burn less rapidly, but the combustion is much more perfect. This can at once be made evident, for by turning the fire-basket, so as to have the black fuel uppermost, a dense column of smoke begins to ascend at once as in the ordinary fire-grate, but, no sooner is the basket reversed, than the volume of black smoke disappears, and the fire burns with little or no smoke. The 'Leopold' Reversible Grate is adapted to all fire-places as ordinarily constructed, the fuel, whether wood or coal, being put on in the ordinary manner. There is no gearing to get out of order, and the uppermost grating is self-fastening as the fire-basket reverses. The patentees have also applied this principle to dog stoves, in which case the basket is suspended by two side standards. A further recommendation to the 'Leopold' grate is its very moderate price.

The 'Shrewsbury' Warming Apparatus, invented by Mr. William White, F.S.A., 30A, Wimpole Street, W., consists of a radiating furnace, about which is built a chamber for the circulation of warmed air. The speciality consists in introducing fresh outer air in such a manner as to bring it side by side with the stream of warmed air, mixing with and dispersing it, and thus affording a more efficient means of ventilation. The fire does not come in contact with any of the ironwork, except the fire-bars, so that the air is not burned, and as the smoke is made to pass through the hottest part of the fire, and cold air is kept from coming in contact with it, the combustion is perfect.

Mr. G. Kerr Hannay, of Haverthwaite, near Ulverston, exhibits an open fire-grate for burning either anthracite or bituminous coal. The back and sides are composed of fire-brick, while a block of the same material (and which constitutes the peculiarity of the stove), covers the whole fire, rising at the back of grate a little above the level of the top bar, and leaning towards the front at an angle of about 40°. This from its position naturally gets very hot, and when the ordinary coal is used the smoke impinges against it, and is for the most part consumed. At the same time it reflects a considerable amount of heat into the apartment that would be otherwise lost.

Captain T. E. Clarke, of Minehead, Somerset, a gentleman who has paid much attention to the consumption of smoke and the improvement of kitchen ranges and sitting-room grates, exhibits his Anglo-American Open Fire Range and a Register Grate, based upon the principles named. These articles are manufactured for the patentee by Messrs. Hardy and Padmore, Iron Founders, Worcester. The range, as exhibited, differs but little in appearance from what is known in the trade as the Cottage Range, one of the cheapest forms of kitchen grates made with oven and boiler, and consequently adapted to the smallest kind of house, though it can be made in various sizes, and fitted up in a more complete form, with the aid of tiled covings, etc., for the better class of residence. The difference between this and the ordinary range before mentioned is soon told, and is of the most simple character. By the side of the fire, and between it and the oven, is a fire-box, enclosed entirely in the front, with the exception of a small hole for stirring the contents, which is, however, kept closed by means of a cap moving to and fro as required. This box is open to the main fire at the bottom part of its vertical side. The object of this is two-fold. It may be used as an independent close fire, receiving its draught from that portion of its side open to the ordinary fire-box, and from the small hole in front, and as such can be utilised as an ironing stove, the top of the box and that of the oven being hot-plate, on which the irons are heated. When required for the usual purposes of cooking, the fire is made in the open fire-grate, in front of which roasting can be carried on, and the fuel for its supply, including cinders produced from other fires, is placed in the closed fire-box, when they become coked, and may from time to time be pushed forward into the open fire. The products of combustion having to pass over and through the secondary fire-box (the contents of which soon become heated) in their passage to the oven, are robbed of their deleterious gases to a large extent, and become burnt, which reduces the smoke to a mere minimum. Owing to the heat engendered by the close fire-box, unless a great amount of work has to be accomplished, the open fire may be considerably reduced in bulk. As a kitchen range on the old principle, embodying a good open fire for roasting, coupled with its smoke-consuming feature, and its moderate price, Captain Clarke's range appeals to those owners of the smaller class of property who are desirous to aid the committee in their endeavours to lessen the consumption of smoke. The open fire-grate is one of the improved register class, with a canopied projecting front, forming a hot-air chamber, the air being arranged to enter from the exterior atmosphere, from the room itself or from both, and it is supplied with two draughts, the one direct to the chimney in the usual manner, the other from side flues at the bottom of the fire, up the sides and to the chimney. On closing the valve communicating direct to the chimney, the products pass through the fire and up the side flues, which mainly consume the gases, and when the fire has burnt clear the valve may be opened, and the direct draught obtained. This grate burns ordinary coal, and recommends itself on the score of economy, consumption of smoke, and its moderate cost. Captain Clarke also exhibits Lloyd's Patent Ventilating Grate, manufactured by the same firm. This is based upon the principle of admitting fresh air from the exterior, which after becoming warmed enters the apartment just above the mantel-shelf, with an arrangement for holding water to moisten it should such be considered necessary. A draught valve under the fuel chamber is also provided to admit air to the back of fire, which discharges itself in the usual manner through holes in the fire-brick back, and so promotes combustion. A large reflector, of fire-brick, rising from the back of grate and leaning forward and splayed to right and left with sharp pointed and indented corrugations, forms another commendable feature, assisting materially to throw into the room a large proportion of the heat that usually passes up the chimney. This grate, though introduced mainly as a ventilator, may claim to accomplish the *desiderata* of diminishing smoke and economising fuel, and its moderate price is another of its commendable features.

Mr. T. E. Parker, 1, Clifton Villas, Prince of Wales Road, Battersea, shows an Open Fire-Grate for consuming its own smoke by the following arrangement. The bottom, which is nearly level with the hearth, is a little higher in front than at back, and the opening is reduced as it recedes, so that it assumes, so to speak, the outlines of a blow pipe; this allows a strong current of air to enter for combustion, and somewhat quickens the draught. Immediately at the back of fire is a narrow chamber, at the bottom of which, and in close proximity with the bottom bars, is a fire-clay lump; this naturally becomes very hot, and, consequently, the products of combustion coming in contact with it are mostly consumed before they pass into the chimney.

Messrs. Brown, Bros. and Co., of 53, New Oxford Street, manufacturers of various economical and other close and open fire ranges, heating apparatus, etc., appear in the lists with the 'Oxford' Smoke-Consuming Range. One feature in connection with these ranges is, that they are made in several sizes, suitable either for house-

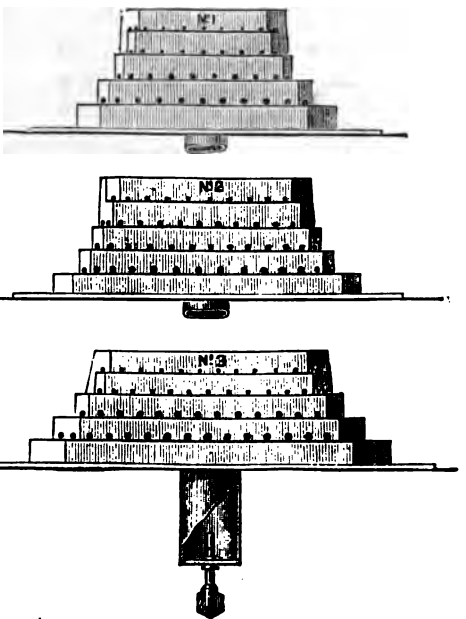
urants, private families, or cottages, thereby meeting requirements of all classes of the community. The ciple which is adhered to is as follows :—The fire-box is ted on the hot plate, the fuel being put in from time me in the usual way, but instead of the products of ɔustion passing directly into the chimney, they are 'n through the fire and consumed, the flame or caloric , being all that is left, is then made to travel over each of and under the oven, finally entering the flue at the . By this arrangement great economy is also obtained, n addition to a smaller amount of fuel being required, ɔst any kind can be used.

GAS APPARATUS AND APPLIANCES.

essrs. Franklin, Hocking, and Co., Limited, Hanover et, Liverpool, illustrate their system of heating water neans of coke or gas. The subjoined engraving s a sectional view of the interior of the coke boiler, :h is self-feeding, is made in various sizes, and will up to about twenty hours with one change of small . A great advantage of Hocking's Patent Boiler hat it does not ignite or discharge the smoke or :s up the centre, as will be observed by reference to the

ring. The heat passes up outside the centre tube, and ing in contact with clear heating surfaces, the coke es, and is gradually consumed as it falls automatically he fire-bars. It is claimed by the makers that one-half cost of this boiler may be saved during the first year ɔnsumption of fuel alone ; and when worn out, being made of copper, it will realise a good portion of the remaining cost for old metal. The company are exhibiting several examples, in one case a No. 5 boiler (capable of heating from 800 to 1000 feet of 3-inch piping) which appears to diffuse its heat with an equal temperature at all points. A gas boiler made upon a somewhat similar principle is also exhibited, and a variety of hot-water heat radiators of different shapes and power, one of which we illustrate. All Messrs. Hocking and Co.'s appliances are made of copper, except perhaps the base, which is of cast-iron, consequently they are of a very lasting character, and have a cleanly and cheerful appearance. The one illustrated is oval in form, and contains a vessel about four inches deep on the top, filled with water perfectly clean and pure as in a tea-kettle, and always ready for use when the radiator is at work. A small saucepan, such as is used as a warming apparatus, stands in the centre of the water vessel, and can be used for warming milk, soups, or other liquids, the appliance being intended for a bed-room or nursery. All these stoves or heat radiators produce their effect by means of gas and the circulation of hot-water through concentric, or what may be termed, double surface radiating tubes, through which hot-water is kept in continual circulation by the action of a small atmospheric gas burner, in an inner chamber, whereby, coming in contact with water surfaces, the heat is reduced to a low moist temperature, which, falling to the lower strata of the air of the apartment, renders it perfectly inodorous. They appear to be efficient appliances, and are attracting a considerable amount of attention.

A firm well known north of the Tweed, Messrs. Waddell and Main, Argyle Street, Glasgow, exhibit several special inventions for which they claim merit. The burners adopted by this firm for their cooking stoves are the ordinary white flame, burned in patent jets, and not the atmospheric, as generally used. They are lined with fire-brick, and have a special burner for browning pastry, etc., by reflection. Besides this, they are excellently made, and present to appearance a compact and good looking apparatus. Not having had much experience of the white flame burner for cooking purposes, we can



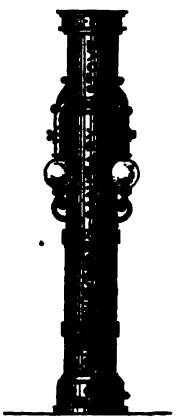
only offer as a guide to our readers the testimony of some of the firm's customers, always premising that a crucial test was undertaken at the late Gas Exhibition at Aberdeen, when one of Messrs. Waddell and Main's cookers was placed in competition with another by an English maker using the atmospheric burner.

The result, with a joint of exactly the same weight, roasted the same length of time, was, that the meat cooked in the Scotch stove was thoroughly well done throughout, while the other was completely raw in the centre. These cookers are made in a variety of sizes, with and without boilers, plate warmers, etc., and are well worth the attention of those about to adopt cooking by gas in their households. The firm make apparatus on a larger scale, as well as the small articles, for boiling, grilling, etc., and hot closets. They manufacture extensively, stoves for heating purposes, and here again solidity coupled with attractive appearance has been well studied. We illustrate a new description of gas fire, called 'Hislop's Metallic Gas Fire', of which Messrs. Waddell and Main are the sole agents. Our engraving represents the burners, in three different sizes, which are made of a metallic compound, and laid in the fire basket of an ordinary open grate, Asbestos is used to fill up the basket, and the gas may be turned down very low when the fire is well alight. By the arrangement of this burner, the gas is heated to a very high temperature before combustion, and we are informed that experiments made with it in the early part of the year in Scotland, when it first came out, gave a uniform temperature of 62 degrees Fahr. with a No. 3 burner (the largest size shown in the engraving), in a room 31 ft. by 16½ ft., the atmosphere outside at the time registering twenty-one degrees of frost, and that the same results in a room 20 ft. by 16½ ft., were obtained with a No. 2 burner. It has also the advantages of being very moderate in price as compared with other appliances of the kind.

Amongst the numerous appliances for regulating the supply of gas, known as 'Governors', must be mentioned the 'Gravity Governor', exhibited by the patentee, Mr. John McLennan, of 84, Finsbury Park Road, N. This little appliance is equally applicable to the regulation of a single burner, or of the largest meter in use, and although it would require to be increased in size for the larger work, a much smaller one than is usually necessary in other regulators suffices. The appended engravings exhibit its applicability to single burners, either fish-tail or argand. As shown by Mr. McLennan, the small containers in which the regulators work are made of glass, through which its action can be seen, but it is not necessary that it should be

of this material, as metal will answer the purpose equally well. The glass, however, enables the action to be seen, and the slightest turning of the tap of the burner clearly shows the sensitiveness of the apparatus. A tube connected with the supply, rises through the glass body, and this has two openings, the one near the bottom admitting the gas to the container, and another towards the top to feed the burner, the passage in tube being necessarily arrested in the centre. The regulator consists of a square disc, which covers the lower or inlet hole, and a little (partly conical-shaped) valve of ivory, or some such material, which acts against the top opening. These are connected by a thin rod of non-corrosive metal, and are balanced in the centre by needle points working on an axis, so that danger of corrosion is avoided. For the larger ones, agate bearings may be used if considered necessary. The regulator is capable of governing the quantity, and keeping up an uniform supply of gas by the simple, but unerring laws of gravity and force, and is perfectly automatic in action. When the tap is turned on, a supply of gas is immediately admitted to the container, and according to the quantity burnt, or the pressure from the main, so the valves oscillate, but no undue pressure can alter the supply to the burner itself, as in the event of the former taking place, the top valve is correspondingly closed, admitting only the proper quantity to be burnt. It is an admirable contrivance to attach to the supply for a cooking stove, to prevent the rushing of gas caused by undue pressure, and to secure that uniformity of heat so necessary in cooking. But its uses are universal wherever gas is used, and the saving as compared with non-regulated lights is something considerable, besides which, it obviates that undue flaring of lights when a portion is turned off, as not the slightest difference is observable in the remaining ones, and, as a piece of mechanism, it is simply perfection.

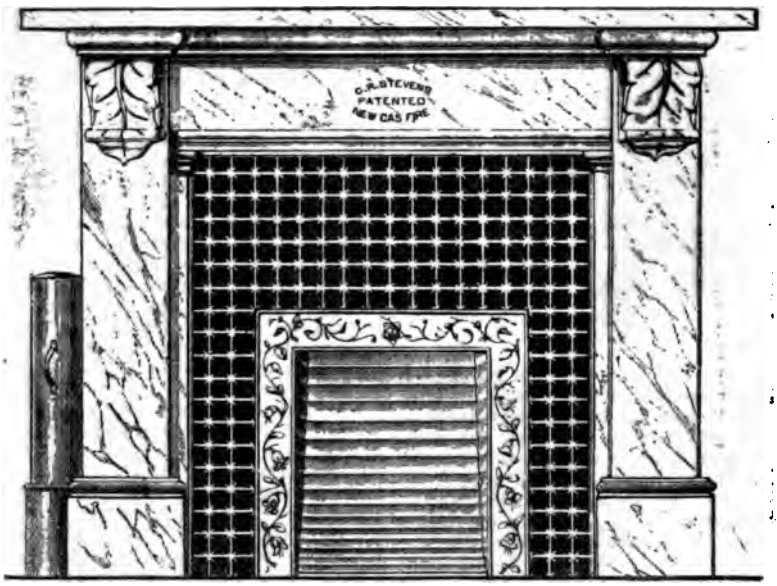
Messrs. Strode and Co., the noted firm of gas engineers and electricians, of Osnaburgh Street, Regent's Park, confine their exhibits mainly to gas appliances, and amongst them are to be seen several charming little sconces, having back plates of art tiles mounted on velvet, the gas burners being of the porcelain covered type to imitate candles. They also exhibit some good specimens of gas fires, and gas and coke combined, to which we have already adverted in the SANITARY RECORD. There is in addition a grate, burning anthracite coal to great perfection. One of their most important exhibits is, however, a handsome gas lighting, heating, and ventilating stove, 'Schonheyder's Patent Sanitary Stove. We append an illustration of it.



This stove embodies all that the leaders of sanitary science consider necessary in a heating apparatus, viz., a constant supply of fresh warmed air, efficient ventilation under perfect control, with the additional advantage of one or two argand burners outside the apparatus, providing a strong light, and being the source from which the heat is obtained. The same arrangements that supply the heated air in the winter, can be utilised for conveying fresh cool air in summer. A further commendable arrangement in this stove is, that if a moist atmosphere is required, as in the case of conservatories, etc., a vessel of water placed at the top supplies this requisite. In appearance it is a vertical column, which can be made either ornamental or plain. The burner is placed in the front, carrying a glass chimney, over the upper part of which is a metal tube, conducting the hot

he centre chamber. From thence it is carried down gh a narrow circular chamber, and again upwards gh a series of gills or baffle plates. As a proof that at is well utilised, the products are discharged through pper pipe into the chimney, at a temperature of not than 140° Fahr. The cold air from the outside, is introduced by a small pipe, enters the stove at the m, is warmed in its passage upwards, and emitted into artment at the top. Here the usual circulation takes and the air eventually falling to the bottom of the enters the stove again, and is discharged into the ey with the products of combustion. By the means yed for ventilation, draughts cannot exist, and the atus is capable of many modifications, according to ons in which it is intended to be used. This stove is adapted as a supplementary heating apparatus for s, to which attention was called in a paper read at the ition on this subject.

Stevens, of Loam Pit Vale, Lewisham, whose ions we have had occasion to refer to on previous ons, exhibits a new application of his patented steam orised hot-air heaters, which we illustrate. The one



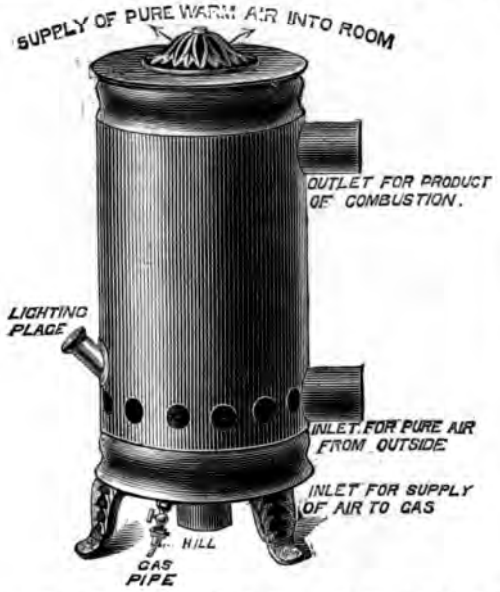
stion is intended to take the place of a sitting-room although it can be utilised for any other heating pur- provided an outlet can be obtained for the exhaust or vapour. To the range of piping is attached a , in which a small quantity of water is kept supplied copper reservoir, above the gas inside the iron casing, supply-cistern with the usual ball-valve, or other nce of a suitable character, connected to the heater ipe, the gas causing the water to be generated into , and this and the heat from the gas rise through the , and back again along the top pipes, an outlet pipe provided to carry off the exhaust steam and particles mbustion. To those who are acquainted with the of steam as a heating agent, this appliance will mend itself, and in its combination with hot air it rs still more useful, the heat generated being sufficient, ried to the next floor, to heat another room of ordinary sions. The cold air of the apartment, circulating d the coil, naturally becomes heated, and adds y to the warmth produced, which is of a most genial cter; whilst from the combination of heating agents named, the cost is very small. The apparatus may ide in a variety of designs, the engraving showing one eerful gas fire, with an ornamental open screen in front coil. The reservoir and stand are made ornamental, e the place of an ordinary coal vase. An asbestos gas fire can be substituted for the 'cheerful' if desired, or either of them may be dispensed with altogether, and an ornamental casing for the coil be substituted. Mr. Stevens may justly be complimented for the ingenuity of his invention, which is adapted for heating at a small cost on a much larger scale than he has hitherto applied it to. We understand that he intends to try this system on a more extended scale, and the amount of heat that he anticipates will be obtained, from a small consumption of fuel, he estimates to be very great.

Messrs. Webster and Co., Market Street, Nottingham, have a good display of their specialities, amongst the most important of them being the well known Duplex Gas Burner, in which the two flames are so situated as to admit of a current of air passing them; this has the effect of uniting them at the edges, but leaving a hollow in the centre; hence, more perfect combustion is obtained, and also a much better light than could be produced from them burning separately. Another good article shown by Messrs. Webster is an arrangement similar to ordinary hearp pendants, which they term the 'Electric Gas Light'. This gives a light equal to about sixty candles, and is suitable for porticos, halls, shop doorways, etc., where a good light is required. The firm also show various kinds of heating stoves, atmospheric burners, instantaneous water heaters, and a combined fire-lighter and stove, the latter being a handy little appliance.

Messrs. G. Wright and Co., of Rotherham, and 155, Queen Victoria Street, E.C., patentees of the well-known 'Bivalve' Grates, have a select show of them in combination with the Siemens Grate, the principle of which has been before noticed in the SANITARY RECORD, but for those who may not be acquainted with it, we may mention it consists of a cast iron angular plate suitable for any grate, and so arranged as to admit air only through certain apertures in front, exactly opposite the gas jets, which meet it, and very much intensify the heat. Coke or anthracite is the fuel used, and as soon as it has assumed a glowing mass, which it will do in about half an hour, the gas may be turned off, and will only require to be relit for one or two similar periods during the day. By this means smoke and smell are done away with, the cheerful appearance of an open fire is retained, and cleanliness and economy are also obtained.

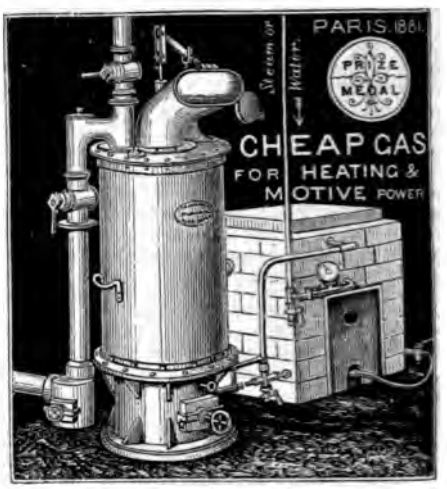
Messrs. Ewart and Son, 346, Euston Road, show an extensive assortment of their well known 'Empress' smoke curers, 'Empress' ventilators, the 'Bijou' and other gas baths, the

'Crown' patent, for instantly heating or boiling water by gas, and their new patent warming and ventilating gas stove, the 'Amethysta', of which latter the accompanying sketch is a representation. The general principle of this stove may be said to be that of admitting the fresh external air, warming it to a genial temperature, and diffusing it instantly throughout the room, which is effected as follows:—A gas burner is situated at the bottom in an inner chamber, the air for combustion entering through an aperture underneath; this chamber extends to the top of stove, terminating in the outlet pipe. As shown, it is of zigzag


SUPPLY OF PURE WARM AIR INTO ROOM
OUTLET FOR PRODUCT OF COMBUSTION.
LIGHTING PLACE
INLET FOR PURE AIR FROM OUTSIDE
INLET FOR SUPPLY OF AIR TO GAS
HILL
GAS PIPE

orm; consequently, the heat and products are kept in t a sufficiently long time to thoroughly warm the sides. The cold air brought in from the outside circulates in the outer chamber, and also has to pass over this zigzag surface, which, as it were, holds it until properly warmed, when it emerges into the apartment in a state fit for breathing. The consumption of gas is very small, and the price of the stove is such as to bring it within the reach of all. It is suitable for conservatories, offices, dwelling-rooms, etc.

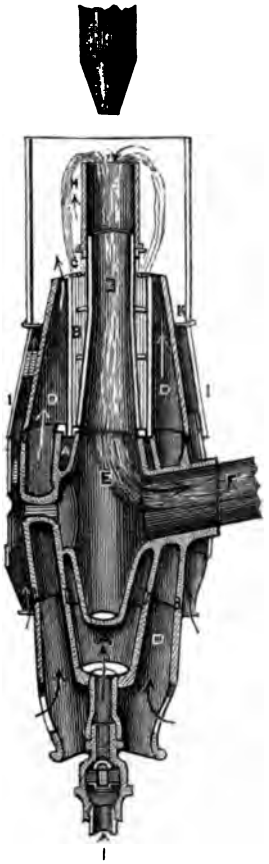
One of the most interesting exhibits connected with gas, and one that appeals unmistakeably to those who utilise this product for various manufacturing purposes, for creating motive power, and for cooking, heating, etc.; as exemplifying the low cost, and the simple manner in which it can be produced, is that of the Dowson Economic Gas Company, Limited, Great Queen Street, Westminster. It has long been asserted that it was possible to produce gas at a much cheaper rate than we now obtain it, and this has been proved to be accurate by the apparatuses that have been in the market for some time for making what has been popularly termed portable gas, but previous inventors have turned their attention more to the production of lighting gas (although their contrivances have to some extent been utilised for other purposes), Mr. Dowson, however, with a keen sense of the growing importance of gas, its many advantages over coal fuel, and the certainty that it will be used far more extensively in the future for the purposes named, has made its lighting uses subservient to its value for the uses named, and has conclusively shown, and practically illustrates, not only the value of his system, but the extraordinarily low price at which he can produce it, and the simplicity of the apparatus employed. The accompanying illustration shows the method. The smallest sized generator and steam superheater (exclusive of the gas holder and purifier) occupy a ground space of only 5 feet by 3 feet 6 inches. The purifier is usually about 4 to 5 feet long by 2 feet wide, and the diameter of the gas-holder can be 6 feet and upwards according to the amount of storage required. The generator A has a cylindrical



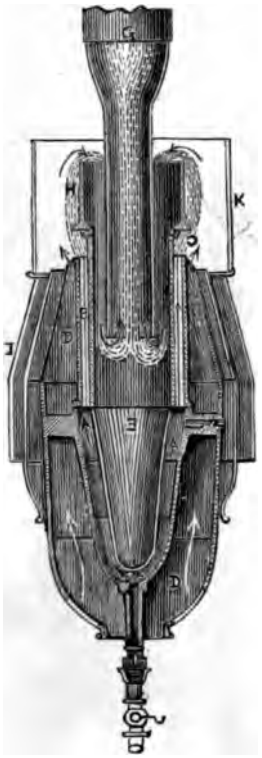
iron body which encloses a thick lining of refracting material, as in a smelting cupola, to prevent loss of heat and oxidation of the metal. At the bottom of this cylinder is a grate, and on this the fire is built up. Under the grate is a closed chamber, into which a jet of steam plays, carrying with it by induction a current of air, and by reason of the pressure of the steam the mixture of steam and air is forced upwards through the fire. The steam is superheated before it enters the generator, and should have a pressure of 20 to 25 pounds per square inch. The steam is produced and superheated in a zig-zag coil of pipe enclosed in superheater B, fed with water from a town supply, from an overhead cistern (about 50 feet high), or from a pump with an accumulator. It is better still to take steam from a neighbouring boiler and to pass it into the coil to be superheated. The quantity of water required is very small, being under 1 gallon per 1000 cubic feet of gas. The coil is heated by some of the gas drawn from the holder, except on the first occasion when the apparatus is started, and then a fire is lighted under the coil. For boiler and furnace work the gas can be used direct from the generator; but where uniformity of pressure is essential, as for gas engines, gas burners, etc., the gas should pass into a holder. The latter somewhat retards the production, but the steam injector causes gas to be made so rapidly, that a holder is easily filled against a back pressure of 1 inch to 1½ inch of water, and at this pressure the generator can pass gas continuously into the holder, while at the same time it is being drawn off for consumption. The fuel recommended varies with the purposes for which the gas is required. For heating boilers, furnaces, etc., coke or almost any kind of coal may be used, but for any application of the gas requiring great cleanliness and freedom from sulphur compounds and ammonia, anthracite is recommended, as the 'stone' coal is very free from impurities, and does not yield condensable vapours. Now as to the cost, etc. It will doubtless surprise many of our readers when we inform them that, with the third-size apparatus, which, broadly speaking, will not occupy a ground space of more than, say 45 square feet, it will not exceed 3d. per 1000 cubic feet, and in the very smallest appliance sent out by the company the same quantity may be turned out at 4¼d. The gas, too, produced is of a very pure character. The *modus operandi* employed is not new, though all previous attempts in this direction, until Mr. Dowson perfected his arrangements, have not been attended with satisfactory results. The uses to which the company have applied their gas up to the present time have been for cooking, baking, heating vineries, small boilers, singeing fabrics, laundry work, heating Lister wool combs, varnish making, gas engines,

and at the Exhibition it is supplying the motive power eating a stove with Dr. Siemen's grate, a Dr. Adam's (which has been previously described in the SANITARY ORD), one of Messrs. Billing and Co.'s gas stoves, lry smoothing-irons, and it is driving a 3½-horse r 'Otto' gas engine of Messrs. Crossley Brothers, h in its turn is running a Siemens' dynamo-machine for ucing several Swan Electric Lights. We think we have sufficient to illustrate the advantages of the 'Dowson' machine, and we confidently recommend it, on ary grounds, to that large class of our readers who connected with towns, corporations, rural sanitary orities, and others to whom are entrusted the spending e public money raised in their several localities, and to n it offers a means of saving a considerable expenditure e course of the year.

is admitted by all who have any knowledge upon ubject that a great future is before gas, as a medium cooking, heating, and industrial purposes. This mably wide range will be apparent by a careful in- ion of the various appliances exhibited, the greater of which were described in the December number of ANITARY RECORD. In its capacity as an illuminator, would now draw particular attention to it upon an ious scientific and entirely new method just intro- l by Herr F. and Dr. Siemens, and which is known ie 'Regenerative System'. The principle of this



er is that discovered by Faraday, that heated coal has a much greater illuminating power than when in the ordinary way, which, after a long series of riments, the inventors have succeeded in applying tically. The gas in a cold state enters a chamber ie body of the burner, from which spring a number nall tubes arranged in a circle, and terminating in jets at the point of ignition. Through these the gas passes, and, upon being lit, burns around a white porcelain cylinder, and turning over the top, descends into the interior



of the burner. It then finds its way through a side suction chimney into a main chimney, situated immediat over the centre of the burner, and so occasions a continuous current. Thus, the waste products of combustion are utilised for heating the interior or regenerative heating chamber, which is soon raised to a temperature of about 900° F. By this means the gas is intensely heated, and the air in adjacent chambers acquires a similar temperature, and, by a simple arrangement, meets it at the point of ignition, perfect combustion and a most brilliant light being the result. Before closing our remarks upon this light, it is only due to Herr F. and Dr. Siemens to point out that in this invention, which undoubtedly eclipses anything hitherto brought out, the quantity of gas consumed is by no means large; on the contrary, each cubic foot of gas gives an illumination of from five to six candles, while a light equal to 130 candles can be produced at a cost of only about three farthings per hour. These burners have been successfully used in lighting the conservatory at South Kensington, and several, in the form of street lamps, are already fixed in Holborn. At present, they are made in various sizes, varying from 30 to 1,000 candle power, but we believe it is intended to construct both largerand smaller sizes.

Messrs. Mart and Bradley, 16, York Street, London Road, S.E., exhibit their Thermostatic Gas Cookers, Hot Plates, etc. These stoves are surrounded by a jacket of non-conducting material, and faced externally with wood, so as to prevent radiation into the apartment, and, consequently, no heat is wasted. The flue for taking off the waste products is so arranged that, at the point of exit, the temperature is only about one-third of that inside. The burners, which are a number of small jets, are arranged in two rows, side by side, and fixed on the bottom of the door, the opening of which immediately lowers them, so ensuring the cook against scorching or burning. We are informed that these stoves are in use in some of the large dining rooms in London, and give thorough satisfaction.

Messrs. Michel and Co., of 49 and 51 New Oxford Street, proprietors of Bilmore's patents, show a good selection of their Patent Smokeless radiator, gas-cooking stoves, gas hot-plates, and gas-heating stoves, and also a new patent 'Combined' stove, of which we append a sketch. The burners in this are placed in the centre,

just above the cone, which, being of planished tin, thoroughly radiates the heat. The upper part of the stove consists of a boiler, and is heated by the same burners, while around the top is fixed a rail for airing linen, etc., making it a really useful article. As will be seen, it is circular in form, and takes up very little room, and as it requires no flue is specially adapted for pantries, dressing and bath-rooms, restaurant bars, etc. It is made in various sizes, and with or without boiler.

Mr. F. Hammond, of 5, Chandos Street, Charing Cross, shows a variety of Stoves and Grates fitted with the Siemens grate, all tending to prove how Dr. Siemens' principle is applicable to existing fire-places. Mr. F. Hammond also shows several Gas Stoves, prominent amongst them being a 4 ft. 6 in. gas range, demonstrating how the operations of a kitchen may be conducted without the production of smoke. An ornamental radiating warm air stove, which also promotes ventilation, is worthy of notice.

Messrs. William Harvie and Co., of 222, Broomielaw, Glasgow, exhibit the well-known Gas Stoves of Dr. Adams, a detailed notice of which appeared in the columns of the SANITARY RECORD of March 1881, so that it is now sufficient to mention that they are applicable for dwelling-rooms, warehouses, public buildings, Turkish baths, various drying processes, etc., as the air may be delivered at any temperature desired, say from 100 degrees Fahr. to upwards of 400 degrees, and may be rendered extra dry or impregnated with moisture. This is effected by means of adjusting valves, which control the inlets and outlets, the action of each stove being proportional to the quality and quantity of gas employed.

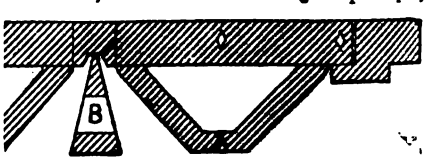
FURNACES, BOILERS, AND APPARATUS USED FOR MANUFACTURING PURPOSES.

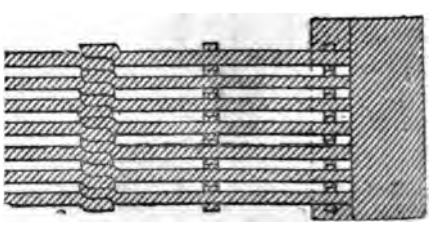
Messrs. Fairburn and Hall, 63, Royal Exchange, Manchester, exhibit their Patent Revolving Furnace Grate Bars, which, when used in combination with the Automatic Injector, also patented by this firm, act as smoke abaters for all kinds of furnaces. These revolving grate bars are a great improvement, being all wrought iron. They project in front a few inches to admit of attaching a key or lever to them, enabling the stoker to revolve them at will to discharge the ashes, and so preventing the accumulation of clinker. The injector admits air and steam, which intermingles with the products of combustion, and prevents the formation of carbon.

A simple, yet effective, and what is of equal importance inexpensive, patent smoke consumer, is that of G. Hunter and Co., of Upper Accommodation Road, Leeds. A great point in the favour of this appliance is its automatic action, which in a few words may be described as follows:—Immediately the furnace door is opened for adding fresh coals, a lever attached to it communicates with a trap at the bottom of an air-passage in the bridge, and simultaneously admits a good current of heated air, which meets and consumes the smoke from the fresh coals just put on. By a suitable arrangement the valve in the bridge does not close with the closing of the furnace, but remains open until the inflammable gases are burnt off. By this means, only sufficient air is admitted to perfect the combustion of each charge of fuel, and so all undue draught to the flue is prevented. Amongst other firms who are using these smoke consumers, Messrs. Herbert and Co., Park Lane Mills, Leeds, have kindly allowed any person to inspect them at their works.

Mr. E. L. Gowthorpe of Nottingham, exhibits a smoke-consuming apparatus, which consists of a hollow bridge, through which air is allowed to pass, the quantity being regulated by a valve or damper placed at the bottom, which is communicated with by means of a rod leading in front of and below the furnace door. A second arrangement for the consumption of smoke in this patent is placed beyond the bridge, by means of air conveyed through bell-mouthed tubes from below the furnace doors, which terminate in a single tube in which there is a longitudinal orifice, through which the heated air escapes, and thus any gas or smoke that may have escaped combustion is thus consumed.

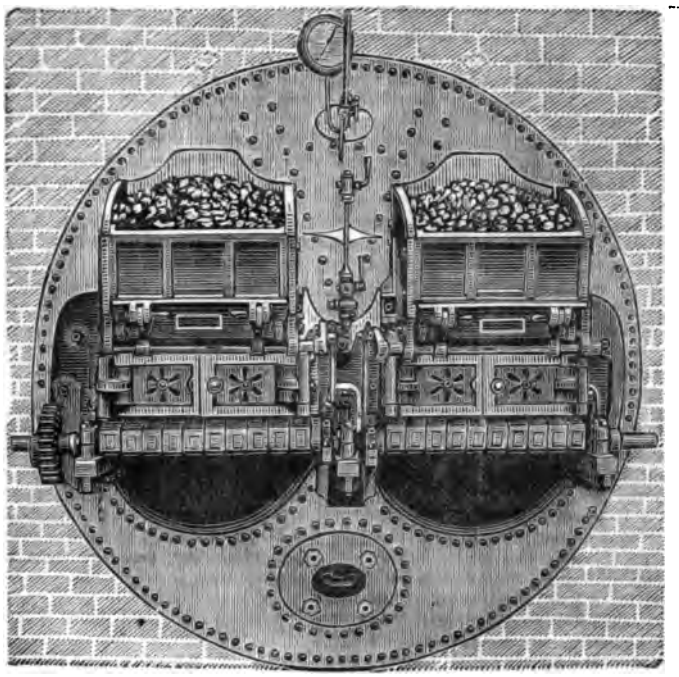
Messrs. Geo. Haller and Co., 50, Lime Street, London, E.C., representing Mr. Kohlhoffer's patents, whose exhibits under another section we have already noticed, show a rather remarkable section of patent furnace bars. These are constructed of a number of separate bars, each about nine inches in length, resting with their ends on supports, between which, each bar has a V-shaped projection



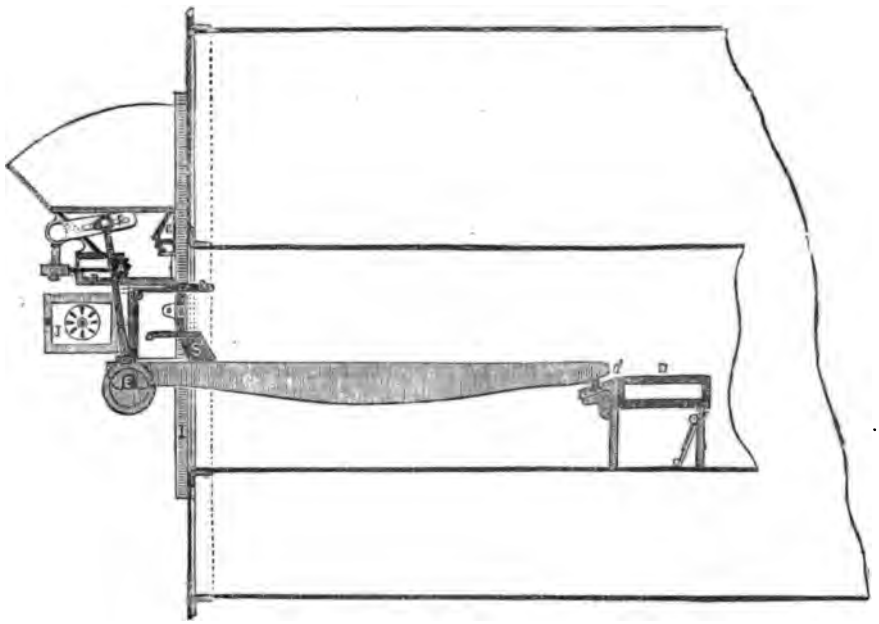


extending downwards a considerable distance in the form of an open loop. By this means an equal distribution of air to all parts of the furnace, and a perfect combustion of the fuel is ensured, the draught is considerably increased, and the bars remaining comparatively cool whilst in use are of great durability.

alluded in the SANITARY RECORD for December 15, age 260, to the patent Mechanical Stoker of Messrs. gall Bros., 10, Mark Lane, manufactured by the erton Iron Works Company, Limited, Chadderton, anchester. We now give a more extended notice, lustrations, as the apparatus appears to us to be of rable merit. Our first illustration represents it



o the front of a 'two-flued' boiler; although so applicability goes, it can be fitted to almost any tion of steam-boiler, without injury or alteration, ere are no complicated fixtures, such as water tubes ets, nor is the iron work complicated by systems of ks and fire-clay blocks. It is also claimed that the ved to enter the furnace is no more than is required for combustion, while, as it has to pass through the fuel, this feature has an undoubted tendency to economise fuel. Another advantage claimed for the McDougall stoker is that the hopper is more conveniently placed for filling with coal than it can be in many others, owing to their arrangement of crushers and fans. This stoker can be fitted to a boiler in twelve hours, and it may be justly said to be a protection to it, as the fuel is not ignited until it is carried past the front plates, while the contraction and expansion of the plates consequent upon frequent opening and closing of fire doors is avoided. Our next engraving represents, in longitudinal section, the application



to a flued boiler of this stoker, with its latest improvements. The fire-bars are actuated by what may be

termed an eccentricated shaft E, of Bessemer steel; the eccentrics are turned on three different centres, and are alternately arranged, each bar resting on, and being driven by its own eccentric or cam. At the bridge end the undersides of the bars are bevelled, and rest on a similarly bevelled portion *d*, of the bridge plate D. When the cam-shaft revolves, it is evident how a bar, in being lifted by its cam at the front end, is at the same time thrust forward, and running up the incline at *d*, is also lifted at that point. While this occurs, the contiguous bars are depressed, by being drawn backwards. The fuel on the bars is carried forward and burnt at a rate dependent on the speed at which the shaft E is driven, and thus the rate of combustion is easily under command. The clinker also, as it is formed, travels from the front to the bridge, on which it is deposited, and is finally pushed over into the flue, and withdrawn by the door provided for that purpose. The bars are spaced about the eighth of an inch apart, and further means for the supply of air for combustion is obtained by perforations cast in them. The fuel is forced into the furnace by a powerful ram A, moving upon the bottom of the hopper B, which the back, immediately above the ram, has a bevel front C, forming, in conjunction with the end of the ram, a jaw of sufficient power to reduce the size of any lumps of coal that are too large to pass into the furnace without being broken. The ram is much less in depth in the centre than at the sides, so that it can only feed the fuel in small quantities on to the centre bars. The fuel fed by this means supplies a thicker and more vigorous fire down the sides, and lessens the thickness in the centre of the furnace. The wear and tear is diminished, and the generation of steam is greatly increased. The motion is derived from the cam shaft by means of the eccentric and connections shown, the feed admitting of variation by adjusting the pin in the slotted lever F, according as 'slack' or 'burgy' coal is being burnt, for shutting it off altogether when hand-firing is being resorted to, in cases of accident to the driving arrangements, or other contingency. One prominent feature in this stoker is the means provided for igniting the fuel before it reaches the bars, thus avoiding the loss due to the tendency of the bars to grind the fuel when the latter is placed on them in its raw state. The coking plate O, upon which the fuel is forced, projects a few inches into the furnace, and immediately underneath it are plates, R and S, perforated with slots for the admission of air. These plates admit of easy removal in but a few minutes, and hand-firing, if necessary, can be carried on through the door J. The plates become red-hot, and so ignite the coal as it passes over them, the coking being continued by the air supplied through the perforations. At this preliminary stage smoke is of course evolved, but before it reaches the bridge it is consumed, because air in sufficient quantity for its combustion passes through the fire, and meets it under conditions the most favourable for effective consumption. The most flattering testimonials have been received by the firm as to the value of their invention, one of the most important being from Mr. Edward Lloyd, the proprietor of the *Daily Chronicle*, at whose extensive paper mills at Sittingbourne, sixteen of McDougall's stokers have been fitted, and have fully equalled his utmost expectations concerning them; effecting a considerable saving of fuel, and regulating steam to much greater advantage. These stokers have been known and valued for some years in Lancashire, where a large number have been erected, while, although only introduced to steam uses in London during the past twelve months, several others have been erected for Messrs. Siemens Bros., Woolwich, the Lion Brewery Company, Messrs. Bryant and May, and other well-known firms.

Messrs. Duncan, Bros., Engineers, 32, Queen Victoria Street, E.C., exhibit Geo. Green and Sons' Patent Water Hearth in connection with a vertical steam boiler, but it is applicable to all kinds of furnaces. It is designed to overcome the difficulty that has always been experienced, more or less, in burning anthracite coal, viz., that of the ordinary fire-bars so quickly being destroyed by the intense bottom heat evolved in the consumption of this fuel. The water-hearth consists of a shallow box made c plates, through which the water of the boiler ci Air is admitted to the fire through a number through this box, which takes the place of furna consequently the expense of renewing bars is obviated, and a saving of something like 25 per fuel is obtained. Messrs. Duncan, Bros., also steam boiler fitted with W. S. Welton's Pate Economiser, also a new patent scraper for steam manufactured by Mr. Arthur Lowcock, Coleham I Shrewsbury. This scraper is based upon the best pri and by a new method of jointing, the internal pr effectually prevented from lifting off the top or boxes, and any single pipe may be taken out and with facility, without disturbing the other pipes. Andrews' of Manchester exhibits of furnace feeders under the charge of Messrs. Duncan Bros.

Messrs. Lewis and Lewis, 11, Laurence-Poultn Cannon Street, E.C., exhibit Newton's Mechanica and Fuel Economiser. Like all mechanical sto coal is supplied by hoppers fitted in front of furn the peculiarity of this one is, that the fuel is inj means of heated air, which has the effect of distri evenly over the whole grate surface: a very object, and not always attained in kindred apparati

Mr. Holroyd Smith, M.I.M.E., Crossley Street, shows quite an original furnace-bar, known as th gonal Column Furnace Bar, the special feature of v that it allows a much greater air-space than is usua the same time it is well distributed, and the cinder are small. By this arrangement uniform combu ensured, adhesion of clinker prevented, and they easily burn out, warp, or twist, as they are natura cooler.

FUELS.

Some of the finest blocks of South Wales coal exhibition are Nixon's Navigation Smokeless Stea the proprietors being Messrs. Nixon, Taylor, and their chief offices are at Cardiff, Mr. Alexander general manager. The coal is the original 'Navig but the name having been used by others to such an to secure the genuine article it is necessary to write to the proprietors. Nixon's Navigation Coal ha known in the market for the last twenty-five years. been supplied to all the large steam-ship companies a and on the continent, and during the whole of the named period it has been used exclusively on boar Majesty's yachts. Special Admiralty minutes have issued, directing that 'Nixon's Navigation' should coal used for trials of speed at the measured mile o Majesty's war ships. H.M.S. *Serapis* on her outwar homeward voyages with H.R.H. the Prince of Wal

	Lbs. of Water evap from 1 lb. of Coal temperature of 10
Nixon's Navigation" Coal was tried 91 times, and gave an average result of	10.01
81 other descriptions of Mixed Coal shipped at Cardiff, gave in 1396 trials an average result of	8.89
71 other descriptions of Coal shipped in the Tyne, Wear, Tees, and other Northern Ports gave in 710 trials an average result of	7.99

his Indian trip, used the 'Nixon's Navigation' steam which was especially selected for that purpose. Se foreign Governments supply themselves with 'Ni Navigation' for royal yachts and special navy requires The coal has also been termed in England and F

he 'Torpedo Coal', it having been used successfully
y makers of torpedo boats, to whom references are
llowed. The area of the firm's mineral property is
wenty-three square miles. The aggregate thickness of
oal is about sixty-four feet, and the production is at
resent 3,000 tons per day from three pits. There are,
owever, five pits fitted up for drawing coal. According to
he Admiralty returns of the trials of coals at Woolwich,
'ortsmouth, and Devonport dockyards, published at
arious dates since 1858, a less quantity of 'Nixon's Navi-
ation' coal than of any other being required to evaporate
given amount of water.

The chemical analysis gives the following results :—

Carbon	89.5
Hydrogen	3.5
Sulphur (trace)	Nil.
Oxygen	5.4
Ash	1.6
	100.0

s characteristics are its unrivalled purity, strength, and an
most entire absence of smoke, and in its not requiring to
touched after being thrown into the furnace. It opens
t, expands, and really stokes itself by its constant motion
the furnace during combustion; and it is confidently
ted that no instance is on record of spontaneous combus-
n ever having taken place with Nixon's navigation coal.
e small coal made in the screening at pit's mouth is
:ensively used for stationary engines, and as much work
a be obtained from it as from the large of most inferior
scriptions. It is used in large quantities by the New
ver Water Company, the Crystal Palace Company, and
numerous factories and mills throughout the country.
ere is with the small, as with the large, little or no smoke
itted in the consumption. It is, therefore, much to be
retted that this coal is not more in use in London, as it
equally adapted for domestic grates of the ordinary type.

MISCELLANEOUS EXHIBITS.

Judging from available information, we do not find
at ventilation in connection with smoke abatement
s received the amount of attention at the hands of
chitects, builders, or those connected with the manufacture
heating appliances, that the importance of the subject
mands. Ventilation is now, fortunately, taking its proper
sition in the construction of most of the new grates that
pear, but here it is only utilised for sustaining a constant
rrent of warm air into an apartment from the outer
mosphere; the warming of a room, however, and the
sumption of smoke, are distinct features, yet with in-
nious treatment it is not at all improbable that the same
r, or a portion of it, might effect both purposes.

There is an invention in this direction, exhibited by Mr.
. Peck Taylor, of Wood Green, N., that has been in
rtial use for about ten years, but perhaps for want of
blicity has not met with that demand that its merits
>ear to deserve. Although the object the inventor had
inly in view in introducing it was the cure of smoky
mneys, which he has undoubtedly effectually accom-
hed; this apparatus probably consumes as much of the
>ke created in our ordinary grates as most of the improved
>es now on view at South Kensington can accomplish,
> like other appliances for introducing external air into
partment, although perhaps of greater use in the winter,
considerable service in the summer for merely venti-
ng the room, the air in this invention entering at the
nd level, or, if desired for this purpose, at a higher
nt also. The invention is of the most simple character,
consists in bringing in an air duct from the outside to
rtain position in the hearth, where a ventilator of any
>roved shape is inserted, by which the amount of air to
admitted can be regulated at will. As the position at
ich it enters is somewhat in advance of the line of fire-
s, it necessitates a similar ventilator being fixed in all
ders having the usual bottom plate, but as tiles for the
rth are now becoming so general, and fenders without
bottoms taking the place of the older ones, one portion of the expense is saved. Owing to the heat of the hearth, the air enters in the first place at a good temperature, and is further warmed by the fire in its passage to, through, and over it, and is thus discharged amidst the products of combustion at such a heat that it is calculated to destroy the separated gases to a large extent before they can escape up the chimney, and so save a considerable portion of what, under ordinary circumstances, is lost, besides effecting the reduction of smoke. A bright glowing fire is also always maintained, and the most unimpeachable testimony goes to prove that the most inveterately smoky chimneys have succumbed to this invention, and have never shown the slightest misbehaviour after the invention has been applied to them. The only other feature connected with Mr. Taylor's plan is, that an air brick is inserted in each of the chimneys, about four feet from the top, to aid the escape of smoke. Here, then, we have an arrangement that can be applied with little trouble to any existing grate, at a comparatively insignificant cost, with the double advantage of consuming smoke and curing smoky chimneys. We have been speaking of it, so far, as regards its application to existing houses, but it is obvious that if Mr. Taylor's views are carried out in the building of new houses, the air ducts can be carried all over the premises at comparatively little additional cost, and will tend much to the comfort and health of the inmates that may inhabit them.

Amongst the changes that the application of science to cookery has brought about, is the use of thermometers in ovens, which are already effecting a salutary change in the preparation of our food, and aiding the education of young cooks in their profession. Messrs. Joseph Davis and Co., of Kennington Park Road, show a good assortment of these little appliances, some of which are arranged to fix on the outside of the oven door, while others are fitted at an angle on an iron stand, for the inside of the oven, enabling the cook to see the amount of heat registered on opening the door, the mercury bulb is out of sight and protected, and all are guaranteed to withstand the highest amount of temperature any oven is subjected to, without breaking. Messrs. Davis are also supplying the executive with the instruments used in the testing houses, and their exhibits likewise comprise a variety of their celebrated Fitzroy barometers, lactometers, water-testing appliances, etc.

A very simple but efficient and inexpensive means of admitting air into buildings without draught is by using Ellison's Patent Conical Ventilators. These are very similar to the ordinary perforated bricks or air grates, but with this difference—that the holes or perforations instead of being cylindrical are conical. They are fixed with the large openings to the inside, which has the effect of diffusing the air all over the apartment, no matter with what force it enters from outside, thus obviating the sharp draughts inseparable from the old sort. Mr. J. E. Ellison, Victoria Square, Leeds, the inventor of above, has another improved ventilating valve, termed the 'Radiator'. This is constructed on the same principle as the conical ventilator, and by its means fresh air may be introduced into a room without any inconvenience at a low level, as it quickly radiates the incoming air, so that no draught is experienced and it can be easily closed if desired.

Mr. C. Boatsch shows his Patent Imperishable Non-Conducting Slag Felt, which is produced by a very beautiful process from Cleveland slag or scoria, and has very much the appearance of cotton wool. By subjection to a chemical process, it is rendered perfectly impervious to the action of acids, and from its extreme lightness and perfect incombustibility is most valuable as a building appliance, as a fire and sound-proof plugging, and as a covering for hot and cold water pipes and cisterns, etc., for which purposes we are told it has been adopted by many eminent architects for the last few years.

C. Kite and Co., engineers, of 117, Chalton Street, Euston Road, London, show their Patent Albert Chimney Caps, Registered Drain and other Ventilators, and a model

of the latter, illustrative of their application to warehouses, etc. They are also admirably adapted for assembly rooms and all other buildings, and we understand that they have been approved by the Metropolitan Board for cow-shed and stable ventilation. The firm also show Improved Inlet Ventilators, specially suitable for ships, coal-bunkers, etc.

THE BRIGHTON SANITARY EXHIBITION AT THE HEALTH CONGRESS.

THE Brighton Exhibition, to which we briefly called attention in our impression of Dec. 15, 1881, was of a more varied character than any exhibition previously inaugurated in a provincial town. Foods, dietetics, and pharmaceutical preparations formed a considerable portion of the display.

In the department of pharmacy and prepared foods, Messrs. Savory and Moore, of London and Brighton, appeared to advantage with the various specialities for which they are famous, amongst which their Malted Infant's Food was conspicuous; their special preparations for phthisical patients were also well represented. Disinfecting preparations, antiseptic wools and dressings, and gelatine preparations, formed a portion of the display, which was one of the most important in this department of the Exhibition. Lloyd's Universal Food, was also exhibited, of which we have already pointed out the merits, which is stated to be growing in public favour.

Messrs. Brand and Co., of Little Stanhope St., Mayfair, made a good display of various preparations of meat, teas, broths, soups, etc., meat lozenges, jellies, invalid mock turtle, as well as preparations of preserved poultry, game, and meat. Delacre's Extract of Beef was also shown. H. W. Brand, Limited, of Vere St., Oxford St., W., had a similar display to that of their namesakes of Stanhope St.

Messrs. Corbyn, Stacey, and Co.'s 'Lactose' food for infants, and, in a different form, for nursing, is of recognised value, and Valentine's meat juice preparations, of which we have already given a detailed account, formed another series of their exhibits. Their pepsine wine, eucalyptus lozenges, and adepsine, were also shown, and that useful apparatus, Corbyn's spray producer, which is entirely devoid of metal in its construction, was also exhibited.

Messrs. Allen and Hanburys, Plough Court, Lombard St., sent their well-known preparations of perfected cod-liver oil, their A. and H. malt extract, and malted farinaceous foods, which are prepared with great care. This firm also showed a choice assortment of medicated jujubes and pastilles prepared by patented processes. Added to this exhibit was an independent case of Schieffelin's (New York) soluble pills and granules, for whom Messrs. Allen and Hanburys are the sole London agents. We described these pills in our account of the Medical and Sanitary Exhibition; they are made in 400 varieties.

Messrs. Burroughs, Wellcome, and Co., Snow Hill, E.C., whose various American specialities are now widely known throughout the United Kingdom, sent a case containing specimens of the various preparations for which they are agents, or with which their name is connected as inventors. All these articles have, from time to time, received due attention at our hands, and their merits discriminated for the benefit of our readers.

Messrs. Mackey, Mackey, and Co., Bouverie Street, Fleet Street, sent a case containing most of the preparations with which they identify themselves, including several specimens of Cod-Liver Oil, Sanitary Disinfecting Powders, Throat Lozenges, etc.

King's Bread and Biscuit Company, Blackman St., Borough, exhibited a fine collection of their prize medal pure wheat meal breads and biscuits, decorticated and finely granulated, and manufactured in strict conformity with the formula of the Bread Reform League; and the first Swiss Alpine Milk Co. (represented by Mr. L. P. Werner, 45 New Broad St.), were present wit parations of milk, to which we have adverted occasion.

Mr. T. W. Beach, fruit-grower and pres facturer, of Ealing Road Gardens, Old Brent preserves we noticed in our recent reports o Exhibition at the Agricultural Hall, sent a assortment of his pure home-made jams, whi considerable attention.

The Aylesbury Dairy Company were well by their specialities in milk and its product Koumiss, artificial human milk, etc.; also t appreciated manufactures of cheese, cream-c and sugar of milk.

The Sussex Co-operative Drug Company, Q Brighton, made a good display of their spec Messrs. John Challoner and Sons, of Brighto large assortment of mineral waters, ginger ale,

Messrs. Struve and Co., Royal German numerous assortment of mineral waters, includi of nearly all the foreign natural waters, and Middle St., exhibited their special features, am we noticed ginger ale and tonic (quinine) wate not omit to mention Messrs. Gulliver and C bury, whose well-known non-alcoholic be amongst the best before the public; and the cialité' lime juice of Messrs. Feltoe and Sons St. A variety of Australian wines were show Robins and Co., of Brighton, also a celebrat known as the 'National Irish prize', and their Brighton tonic ale. Max Greger, Limited, showed their collection of Hungarian wines; the promises to enter more largely into consumpti wine of the claret or Burgundy class.

Mr. Edmunds, of Pentonville, sent his usual of curries, egg custard, and baking powders, Extract of Meat Company was also represented.

Messrs. Wm. Woollams and Co., High St., whose productions in artistic wall-papers free we have had occasion to mention in former nun SANITARY RECORD, were alone in this class and made an interesting display in this section. importance cannot be attached to this element house decoration.

Mr. Hamilton, of Ship St., Brighton, sent mens of invalid and luxurious appliances in furn have on former occasions called attention to pliances.

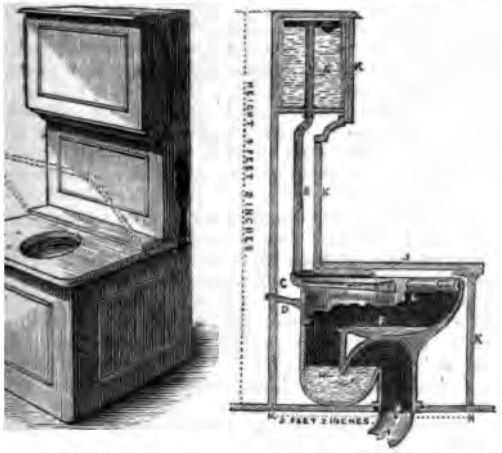
Messrs. Pocock Brothers, Southwark Bridge hibited their excellent tubular water bed, Hansell, of St. Albans, sent a very useful combi convertible into a bassinette with removable ro into a nursery or invalid's table.

Messrs. Chorlton and Dugdale, of Manche present with their several arrangements of the spring mattress, including a new application berths, that cannot be too highly commended, to promote health, cleanliness, and general c sleeping arrangements on ship board.

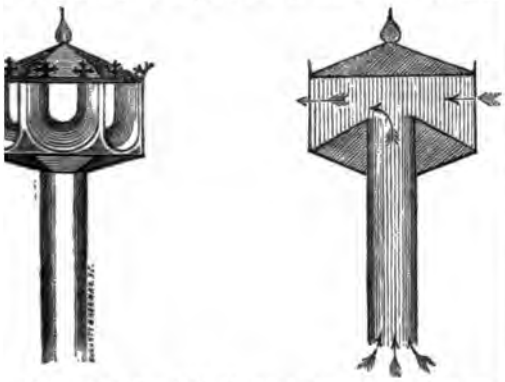
Mr. W. Botting, Ship Street, Brighton, exh patent washout closet and Dr. Churchill's self-v 'Disjuncta' closet. He also showed Messrs. Ma Dublin) patent self-acting flushing tank, and known patent drain joint, with which our rea been made familiar in our columns.

Mr. D. T. Bostel, Brighton and London, made lent display of his various sanitary appliances, we have selected one or two for illustration. sior closet made by Mr. Bostel, has been before for some time, and some very flattering testim been received by him as to its worth. It i one entire piece of earthenware, and is securely that no whiff of sewer gas can at any time e may be fixed in a bed or dressing-room with per The illustration shows one in cabinet form, ver amongst other purposes, for shipboard. Anoth invention is his new flushing cistern which w attached to a closet. This is a very simple an

her, and is on the syphon principle, the handle only iring to be held for two seconds, when it discharges whole of its contents automatically into the closet, ying every particle of soil, etc., direct to the sewer.



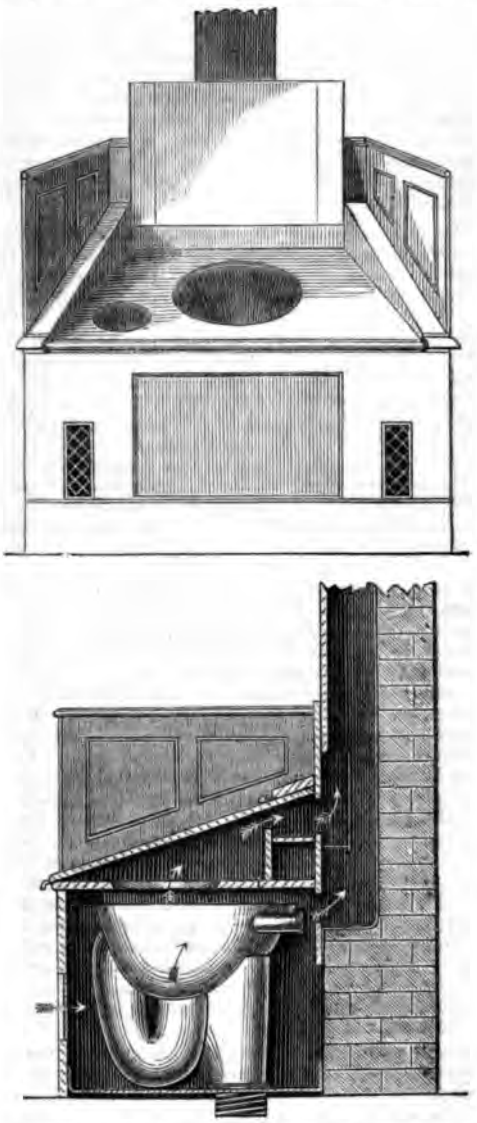
s provided with an overflow pipe, which should be ied direct to the open air where practicable, and it a acts in addition as a small air pipe. There is also a d flushing rim at the top of the closet, which causes water to be carried well all round, and the general ngements of the appliance appear to be of the most fect character. Dr. Hall's patent ventilator chimney d, is another invention of which Mr. Bostel is the sole ter. It is one of those appliances for preventing down ughts, of which so many are now before us, and is ple in its outlines and effective in character. The ap- ded drawings show it in section and elevation. By the ngement of angles and curves, and the relations they r to each other, impure air is drawn out of them



ough any tube to which they may be attached. There o mechanical action to get out of order, and they are becoming popular.

Messrs. Hayward Tyler and Co., Whitecross Street, e also well to the front in this department. The prin- al exhibits were the improved Chinese dragon pattern flush valveless closets, with patent flushing arrange- nts. The elastic valve closet with ornamental basin, a one-inch valve to regulator; the national closet basin ed with Howard's patent water regulator on iron frame, a portable water-closet, fitted complete in mahogany e, with self-acting water supply. This is a very perfect handy appliance. There was also a good selection of atory table-tops and basins, and an improved tip-up in, with marble top and iron standards, forming a ng and inexpensive lavatory. Hot and cold water, bath and lavatory valves, formed a portion of the play, with a variety of pumps, the Brighton pattern rant, and copper stand pipes.

Mr. Thomas Waller, of Fish St. Hill, E.C., made a good display of heating and cooking apparatus, and many sanitary appliances, for which the firm have gained considerable reputation. A model hospital was amongst the most interesting features of the latter class, and is well worth the attention of sanitarians and all those interested in securing the most perfect and health-giving arrangements in sick wards, infirmaries, etc. His patent ventilating apparatus, as adapted for water-closets, is simple and easy of application, and will be found a great desideratum in any house. We append illustrations of this, which



prevents sewage gas, and other offensive smells, entering dwellings through the water-closet. By fixing a tube or duct at the back of the water-closet, with an open mouth extending above and below the seat, the sewage gas, which enters the closet through defective joints in soil pipes or syphon pipes (which frequently become dry) is entirely carried away by the ventilating shaft, through and above the roof of the house. The flap or cover being fixed on an incline, acts in the same manner as a blower to a fire-place. This ventilator is equally suitable for hospitals and sick rooms, by connecting the ventilating tube with the chimney or fire-place. The sectional engraving shows the passage of the

air-duct, which enters from the front, and passes up through the back, or behind the seat. Mr. Waller also exhibited his kitchen-range, arranged with a hot-air chamber at the back, the heat from which can be utilised for heating rooms on the upper floors. A Norwegian stove was amongst the exhibits of this character, to which was attached a boiler, and thus by the combination of hot air and hot water, an entire building can be warmed at but little expense. A register grate, invented by Mr. Waller in the year 1858, on the principle of consuming smoke by means of discharging heated air amongst the products of combustion, a system with which we have become familiarised at South Kensington, was amongst the articles shown, and is another example of an article introduced before public interest was evinced in the question. This grate may now fairly take rank with many of those introduced for the same purpose. An excellent steaming apparatus, with four distinct closets, occupying little space, and so arranged that all can be used at the same time, or one, is another excellent introduction by the firm. The rest of the exhibits were of a general character, in connection with heating and other domestic requirements.

Messrs. Doulton and Co., as usual, had an exhibition of a varied character. We must pass over the superb specimens of works of art contained in the collection of Doulton ware sent to this exhibition, and apply ourselves to the Sanitary exhibits. These consisted of the Ornamental Ventilating Shafts, which form one of the newest features in their output, and are of attractive appearance; water-closets of various kinds, urinals, baths and bath fittings, etc., all of which have been illustrated in the SANITARY RECORD for 1881, and a bath locking apparatus to prevent waste of water, lavatories, drain pipes, traps, gullies, etc. Amongst the lavatories were a few specimens in the Doulton Ware of choice character. A variety of filters supplemented the display, including Bailey Denton's, and the Manganous Carbon Filter (Dr. Bernay's Patent).

Mr. F. G. Underhay, Crawford Passage, Farringdon Street, E.C., sent a variety of brass lift pumps on stands, his patent slide valves, patent equilibrium ball valves, closet and urinal basins, and a variety of complete closets. An exhibition of this kind would not be complete without the exhibits of Mr. George Jennings, of Stangate, Lambeth, who showed an assortment of his specialities. An improved tinned copper bath mounted with elegant fittings was one of its most attractive features. A variety of lavatories, suitable for various classes of buildings, and his spray shampooing apparatus, as arranged to be fitted to a lavatory basin, is a most luxurious appendage. We were also introduced to his patent 'combined' lavatory and urinal apparatus, and patent 'concealed' urinal apparatus on marble slab, with self-acting supply cock, polished wood enclosure and doors complete, both appliances of a most useful character under a variety of circumstances. Mr. Jenning's butler's pantry, sink, and housemaid's slop sinks, are appliances that are well worthy of attention, and all are securely sealed, so that no admission of sewer gas into the house can occur. In closets Mr. Jennings is well able to hold his own against all comers, and his general collection of household and other sanitary fittings is of the first order of merit.

The North British Plumbing Company, Upper Baker Street, London, sent a handsome plunge, spray, or needle and shower bath, and sanitary sitz bath, lavatories, etc.

Washing, wringing, and mangling machinery, were fairly represented, the principal exponents being Messrs. Harper Twelvetrees, The Highbury Sewing Machine Company, and Thos. Bradford and Co., London and Manchester, while Mr. Geo. Kent, of Holborn, supplied a few of these appliances in connection with his usual array of knife-cleaners and other domestic utilities.

The Hygienic Heating and Lighting Company, Limited, North Buildings, Finsbury Circus, exhibited various specimens of Clark's patent 'Syphon' hygienic stoves for lighting and heating by gas or oil, including an attachment of boiler and coil for greenhouses, etc., and a new shaped boiler, capable of heating 500 feet of hot water-pipe as economically by gas as with coal or coke. We shall revert to this apparatus in a future number of the SANITARY RECORD.

Cooking and heating stoves generally were fairly represented, though we did not observe anything new. Mr. Constantine, Fleet St., The Wilson Engineering Co., Messrs. H. and C. Davis and Co., Camberwell, the main features of whose specialities are described in our columns, Edwards, Great Marlborough St., Ritchie and Co., St. Swithin's Lane, and John Wright and Co., Broad St., Birmingham, and Upper Thames St., being the leading exhibitors. Simple yet excellent steam cooking apparatus, suitable for unions, hospitals, or any large establishment, was sent by Messrs. Barford and Perkins, of Peterborough.

Artificial stones, concrete, etc., were contributed by Charles Drake and Co., Limited, Battersea, in a variety of specimens of their marble concrete; Hodges, Boller and Dale, Thames Silicated Stone Works, East Greenwich, The Eureka Concrete Co., Queen Victoria St., E.C., and S. and E. Ransom and Co., Essex St., Strand, all of whose productions are generally well known. Mr. Robert Adams, was present with his usual display of novelties, including his patent fanlight opener and patent safety window, etc.

Mr. Washington Lyon, Asylum Road, Peckham, exhibited his patent steam disinfector, to which we devoted considerable space in the columns of the SANITARY RECORD of Oct. 15, 1881. Mr. Maignen, Great Tower Street, had a collection of his *Filtre Rapide*, and the Silicated Carbon Filter Company, Battersea, sent a variety of their well-known productions of this class. The Water Reform Company, Limited, 62, Fleet St., attracted considerable observation for their apparatus for softening and purifying water, the simplicity of which is one of its most commendable features. The softening of water is not only intended by the Company for domestic, but for steam power use, and is already in use by the Brighton Company, at their works for the boilers of stationary engines, etc. The invention has been patented by Messrs. Atkins and Co., Fleet St., the old-established filter makers, by whom a variety of other domestic filters were also shown.

The Sanitas Company, with their excellent preparations, Jeyes' Sanitary Compound Co., and F. C. Calvert and Co., Manchester, were also represented.

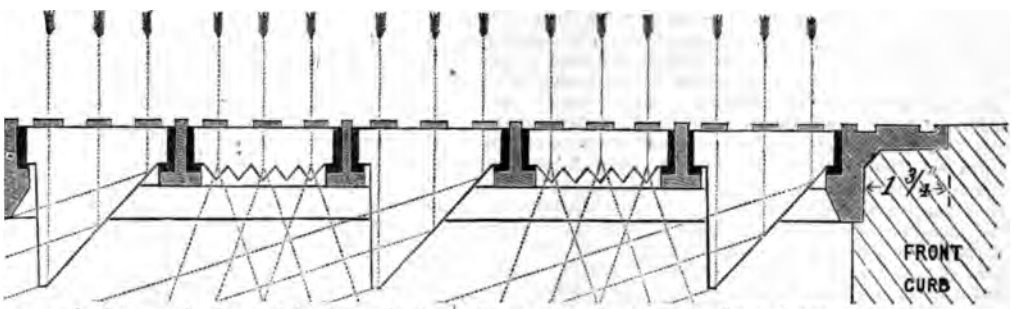
Ventilation in its various features was well cared for, the exhibitors including such firms as Banner Brothers and Co., Billiter St., R. Boyle and Son, Holborn Viaduct and Glasgow, The Birmingham Sanitary Association, Colmore Row, Birmingham, C. Kite and Co., Chalton St., Euston Road, Gilmore and Clark, Danby Road, Peckham, Aldous, 18 Queen's Road, Peckham, and Taylor, Tribune St., Hackney Road, etc.

From a sanitary point of view one of the most interesting features in the Exhibition was a model of Messrs. John Hanson and Co.'s (Wakefield) patent automatic machine for the treatment of sewage, that is already in successful operation in some northern towns. This invention affects such wide issues that it requires to be dealt with in a more exhaustive manner than our space at the moment will allow, but we purpose, in our February issue, to give a detailed account of the apparatus and its capabilities.

Messrs. Hayward Brothers and Eckstein's (of Union St., Borough) patent pavement lights have been before the public for several years, but many may not be acquainted with their peculiar quality to direct light into the basement from the pavement. This has not been overlooked by architects and builders, who are well aware of their special advantages, and use them largely, so much so that we are informed that they have been used in almost every street in London in one form or another—in fact, we may see that for ourselves.

Visitors to the Exhibition, however, were attracted to Messrs. Hayward Bros. and Eckstein's stand by the peculiar appearance offered to the eye, of the underside of

Semi-Prismatic Pavement Light, which was pro- ıide the wall, and enclosed underneath, to repre- ıanner in which these lights are fixed in front of remises, and which will be understood from the ı. It was evident to any observer, that such lights must confer a great boon on those who have to work in basements or under-ground floors, by reducing the use of gas, and also benefiting the proprietors by increasing the value of their property. We think that this firm well deserve the bronze medal awarded to



concur in the remark of one of the judges in the l that plaintiff had discovered a 'light-directing-light', if he might be allowed to so express it ɔrd. The rest of the exhibits do not call for ɪular remark. The building was lit with the the British Electric Lights.

CORRESPONDENCE.

nunications must bear the signature of the writer, not necessarily for publication.]

-POX HOSPITALS AND SMALL-POX.

issue for December 15th, there is a leading er this heading, which reproduces certain state- e by Dr. Collie, in answer to some statistics pre- ıe, and to a memorial addressed by the Hackney Committee to the Asylums' Board. Dr. Collie s his answer by stating, that the Committee have fundamental error of comparing epidemic with non-epidemic years (1861-70). To this at during the last named ten years (1861-70) no less than three in which small-pox was epi- l that in one, viz., 1863, the mortality from was greater than in any other year between 1848 having caused 693 deaths per 1,000,000 popula- ıdon against 719 in 1877 and 538 in 1872, which by Dr. Collie amongst epidemic years. Dr. Collie that the hospital was re-opened in 1880, because ans of Hackney asked that this should be done, mall-pox existed in the vicinity'. Now it is not ıe Guardians wrote such a letter, or that small- 'e in the vicinity of the hospital at the time it was he facts are otherwise, as numerous cases had sewhere in Hackney in November, December, and hilst there was not a single case in the immediate the hospital until about six weeks after it was mely, during the third week in March, the hos- g been re-opened on February 8th. Dr. Collie stress on the immunity of the inmates of the ndon Union from small-pox ; but, at the most, hows that the disease is not always readily com- by air. From the statement as to the Homerton College, one would imagine that no cases had ıere in 1877, but it is a fact that two cases were ı that year from the College to the Highgate It is true that Principal Liddell was not able to ıion to the hospital, simply because he could not infection to any cause whatever. Dr. Collie also states that as many cases occurred round some of the Board schools as round the hospital. This is not correct. Dr. Collie admits that he has not the material for treating the memorial exhaustively, but he might have had much more information if he had applied to me in the same way as Dr. Bridges, the Inspector of the Local Government Board, did. I told Dr. Collie he could have every detailed information from me if he applied for it ; but he did not do so.

As regards my statements, Dr. Collie has never grappled with one, but tries to dismiss them with a side thrust, or with sophistical arguments. Thus, he compares the number of deaths at Hackney Wick, near Victoria Park, during 1861-71 with those of 1871-80, and never tells his readers that a majority of the houses has been built there since 1871. He refers to Clarence Road, and leads anyone to suppose that because eight deaths occurred in ten years amongst about 950 inhabitants (frequently changing their residences) against one in 1861-70, that therefore, as there were eight times as many in 1871-80 as in 1861-70, my statistics are valueless. He states the number of deaths in several streets, including Clarence Road, but does not refer to the number of inhabitants. He says the vicinity of the hospital must have some affinity for small-pox, as the disease was very prevalent there in 1861-70. This again, whilst partly true, is utterly misleading in the sense employed, as the chief number of deaths near the hospital in 1861-70 occurred in one street during one epidemic only. Dr. Collie also leads one to infer that the Committee requested the Managers to divert the traffic of the ambulances from College Lane to the streets now used. I deny this entirely, as the Managers themselves caused its diversion, whilst the Committee proposed it should pass along another street after the entrance had been widened. The rest of Dr. Collie's statements are equally open to exception, but your Journal is not suitable for discussing such a matter at length.

My charges against the hospital are (1) that it is constructed in a manner which Dr. Collie himself would have said to be highly objectionable two years ago, if any other than a Board's hospital were under consideration ; see his paper on the 'Management of Small-pox Hospitals'. (2) That the mortality and number of cases reported to me around the hospital were excessive, as compared with other localities in the district, as the following shows :—

Summary for the ten years 1871-80.

	Annual Number per 1000 population. Deaths.	Cases.
In streets adjacent to the Hospital	4.1	12.1
In streets within a quarter-mile radius, including the above mentioned streets	2.45	9.1
Amongst 30,177 other persons living in small houses	1.60	5.7

(3) That although no decided change has taken place in the status of the inhabitants of Hackney, the death-rate from small-pox was exceedingly high in 1871-80, when compared with that for all London, as in 1861-70 the deaths per 100,000 inhabitants was 28 in London, against 17 in Hackney, whilst in 1871-80 it was 46 in London, against 64 in Hackney. These figures are not referred to in Dr. Collie's answer. (4) That the disease was persistently present in the vicinity of the hospital during the whole of the ten years it was open, whilst in other localities, although

a severe outbreak occasionally occurred, it did not prevail year after year in the same way as around the hospital. (5) That when the hospital was closed, the number of cases was not so great as in some other streets, and that small-pox returned very soon after the hospital was re-opened. This happened in 1876 and 1880, the only two years in which it has been re-opened after it was closed.

JOHN W. TRIPE, M.D.,
Medical Officer of Health for the Hackney District.

'SANITARY INSPECTORS'.

I quite agree with your correspondent 'Cui Bono', that it is time an Association or Union of Sanitary Inspectors was formed, to enable them to ventilate freely their grievances. There are other views to be taken of the question besides the 'appointment'. At the present time, some hold their appointment under Rural Sanitary Authorities at a fixed salary, and are expected to carry out the extra duties imposed on them by urban powers, without any remuneration. The too frequent mode of appointing them from year to year gives rise to great dissatisfaction, and the day of re-appointment is generally made the yearly field-day for lowering his salary, or appointing him for a shorter period, especially if he should happen to be so unfortunate as to have incurred the displeasure of some of the guardians, which may easily be the case in a rural district, where he is so often brought into collision with farmers. To secure the faithful discharge of the duties, the appointment should be a permanent one. I know of a recent case, when an inspector was appointed under the Public Health Act, 1872. Various structural works were required to be carried out, including levelling and making plans. After a large portion of the work had been completed, his employers took into consideration the services he had rendered them, and in a liberal moment voted him an increase of £10 per year as Surveyor, and reduced his salary £10 per year as Sanitary Inspector.

SANITARY INSPECTOR.

THE DISINFECTANTS AT THE BRIGHTON SANITARY EXHIBITION.

We are requested to publish the following copy of a letter, addressed by Mr. Kingzett to Mr. Hamilton, Hon. Sec. of the Brighton Sanitary Exhibition recently held.

'William Hamilton, Esq., Hon. Sec.,
Brighton Sanitary Exhibition.'

'It is with great regret that, on behalf of this Company, I feel compelled to record my protest against the manner in which the disinfectants exhibited at the Brighton Sanitary Exhibition were judged, to use a word which is not justified by the results.

'The gentlemen whose names were published as judges, did not officiate, so far at least as disinfectants were concerned, and no adequate investigation was made by the persons who were, without the consent of the exhibitors, substituted to act in their place.

'I do not wish on this occasion to set forth the claims of my Company regarding the 'Sanitas' manufactures, but I do wish to emphatically assert, that the judgments carry no weight whatever from a scientific point of view; and I challenge the truth of them.

'C. T. KINGZETT, F.I.C., F.C.S.,
Managing Director.'

'The Sanitas Company, Limited,
Letchford's Buildings, Three Colt Lane,
Bethnal Green, E., London, Dec. 27th, 1881.'

MODE OF APPOINTMENT AND TENURE OF OFFICE OF SANITARY INSPECTORS.

I am glad to see you have kindly published my letter, and, from the foot-note, I gather you invite discussion.

By the Act of 1872 the Sanitary Authorities have appointed Sanitary Inspectors throughout the kingdom, but we feel the tenure of office (in many cases one y short a period, and some have cause to compla the end of their year, they have had reduced s increased work; a yearly election hanging over at all pleasant. An officer should be placed on more independent footing; if he is a practical m up to his duty, he is, at least, entitled to the same as a relieving officer. I think the first thing to a more permanent position at the hands of the Loc ment Board.

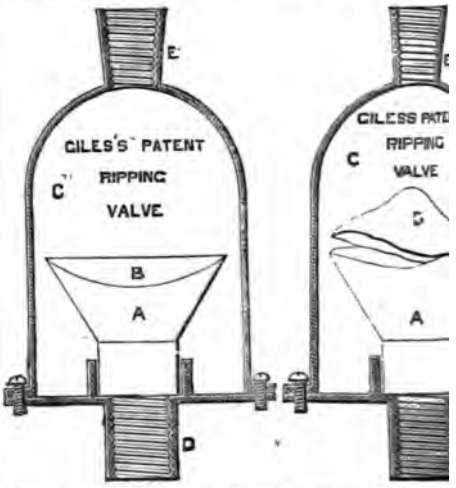
I trust this question will be taken up and well through the columns of your valuable paper.

CUI

SANITARY INVENTIONS.

GILES'S 'INFALLIBLE' RIPPING (SA VALVE.

In the SANITARY RECORD for March and Apri entered somewhat exhaustively into the question from explosions in kitchen boilers, rendered ne the many accidents that occurred about that tin to the severe weather and the absence of app secure immunity from danger under such conditi then illustrated several safety valves; and we a an opportunity of impressing upon those persons high pressure boilers in their houses the necessity o themselves from the dangers already referred to, b ployment of a safeguard against explosion. The i of which we are about to describe, which has rece brought under our notice, offers one of the most s reliable safeguards from explosion yet seen by append drawings of the appliance in its normal a shattered condition. It consists of a bell-shape C, that may be made of brass or iron, with a scre at the bottom D, to connect with the boiler, and one at the top marked E, to which a pipe is that can be carried to the most convenient out the lower part of C is fixed an inverted hollow closed by a copper concaved cap, piece B. will be seen, is in direct communication by



the screw D with the boiler, the steam from wh time to time rises into it. So long as everyth on in its normal condition, no alteration tak but immediately circumstances arise that rend plosion imminent, the force of steam will raise th cap B, and cause it to assume a convex form as and burst as there shown, thus liberating the s water, and causing it to escape or expend itself th pipe attached to E It will thus be seen that an beyond that of the cone is impossible, and no d

from that, and all that is now wanted to repair nage is a new copper cone. These cones are stand a pressure of from 40 to 100 pounds to the inch, and, as steam in an ordinary kitchen boiler eaches the minimum pressure mentioned, but little of even the cone bursting is to be apprehended. e seen one that burst at a pressure of 50 pounds, umed very much the appearance given it in ; a complete description of this apparatus will d in the specification of patent, page 312. Mr. of Royal Parade, Blackheath, the inventor and of this valve, deserves credit for the ingenuity of his n, and we are satisfied that it is one of the most and effective safeguards it is possible to employ.

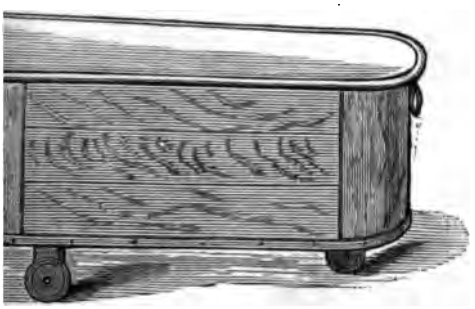
WOOD'S PORTABLE COMMODE.

d's patent portable sanitary disinfecting commode, ctured by Matthew J. Hart and Sons, Great Barr Birmingham, is one of those articles which are indis- e in the sick room, and fiulfils that important atum, freedom from smell. The appended illustra- ves the configuration of the apparatus, which is of strong tin plates, and can be japanned in colours to match toilet ware or furniture. It close-fitting hinged cover, which effectually seals up

sel, thereby avoiding risk of contagion; whilst by of the spout at the back, the contents can be emptied : unpleasant exposure. A chamber to hold a disin- is inserted into the spout (also shown in the ng. The disinfectant may, of course, be of a varied er. A sponge saturated with a fluid or loose pow- y be used at will. A bed pan, with similar arrange- made by the same firm, has been spoken of most bly by many medical men, both for private and l use, and the commode appears admirably adapted : on ship-board and for general purposes, where closets are inconveniently situated.

ALLEN'S HOSPITAL BATH.

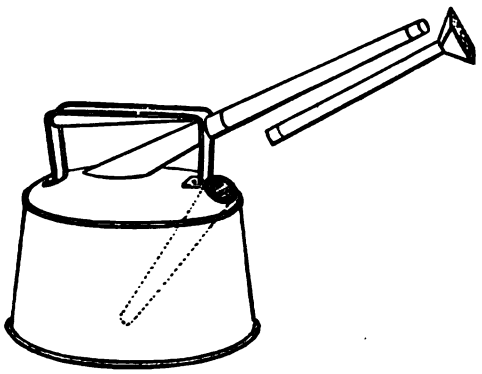
rs. James Allen and Son, of Marylebone Lane, many inventions for the hospital and invalid's r have from time to time proved most useful to k and an aid to the medical man, have called



tention to their new hospital bath for use in cases let fever, etc. Made of strong tinned iron, japanned outside, and mounted on a strong wood bottom with wheels, it is just that sort of appliance that is very useful in a hospital ward; it is also calculated to stand any amount of hard wear. It is fitted with a draw-off tap, placed so close to the bottom that every drop of water may be run out; to save time, an india-rubber tube may be attached, and it will then empty itself.

GROOM'S BRONCHITIS KETTLE.

A cheap bronchitis kettle is a boon to the million, and Messrs. Groom and Co., of Liquorpond St., whose inventions of a sanitary and hygienic character we have had occasion to advert to on several occasions during the past year, have added to their success by introducing a bronchitis kettle at least one-third lower in price than anything they have hitherto made. We append an engraving, but



it in no wise differs from its prototypes, except as regards price, and a little alteration in the arrangement for holding the loose spout, which also gives notice to the nurse when a fresh supply of water is required. It is obvious that steam cannot flow from this tube, which is open at the bottom end, so long as the water line is above it; but when it has evaporated itself below the lower end of the tube, steam will also be emitted from it as well as the spout, and shows that the kettle requires replenishing. This kettle can be purchased retail for 5s.

TRICYCLES.

The publication of the article on the advantages of tricycle riding, which will be found at page 283, has induced us to make some inquiries amongst the leading manufacturers and depots, with a view to make known to our readers any special features of interest in connection with the various machines made, as some little guide to those who may contemplate a purchase. To those persons who have no particular liking for any one maker's tricycle, the establishment of Mr. H. Goy, the outfitter and *magasin* of gymnastic apparatus, etc., at the corner of Leadenhall and Lime Streets, E.C., offers great advantages. There is scarcely a maker of repute whose tricycles cannot be seen in these extensive show-rooms, thus obviating the necessity of going from one warehouse to another, involving fatigue and loss of time. Apart from the machines themselves, every little accessory and appliance connected with them, or necessary to their use, are here supplied, and a most useful arrangement is offered by the firm to those of slender means, as in the case of youths desirous of purchasing a bicycle, in the adoption of a similar plan to what is now known as the three years' system, by which the articles required can be paid for by instalments, and yet handed over to the purchaser at once. Age, weight, class of work required, and peculiarities of arrangement, have all to be considered in the purchase of a bicycle, and a place where each kind can be seen, and fairly tested, is calculated to prevent mistakes by the purchaser, and to render after-dissatisfaction a matter not likely to occur. Mr. Goy publishes a little work monthly called a *Calendar of Sports*, which can be had gratuitously by every

one who applies for it, and which is full of useful information of a varied character on the subject of bi- and tricycles, and on athletic exercises generally.

DIETETIC NOVELTIES.

AMERICAN A.B.C. CEREALS.

Mr. Ernest Hart, in his first article on the 'Hygiene of Food' (Breakfast) published in the SANITARY RECORD of Jan. 15, 1880, strenuously recommends the introduction of porridge for the first meal, and points out how easily this dietetetic improvement may be accomplished by the use of the American A. B. C. Cereals. The value of this form of farinaceous diet to the young, to working people, and to dyspeptics, warrants us in again calling attention to these A. B. C. Cereals, which have grown in reputation in this country, and are, we are glad to learn, coming into more extensive use than might have been anticipated in this conservative land, where tea, bread and butter, and bacon form the staple breakfast of the majority of families.

These cereals comprise preparations of white wheat, barley food, white oats, maize, cereal milk for infants, and cereal cream for dyspeptics, invalids, and nursing mothers; all the cereals used being hulled, crushed, steam-cooked, and desiccated. A strong argument used in favour of these preparations is, that cereal food in its natural state when cooked at home is very rarely properly prepared. In the preparations under review, the preparatory cooking, independent of the care employed in the selection and preparation of the cereal itself, renders its after cooking a matter of a few minutes only. It is also confidently asserted that two pounds of the cooked food are equal to three pounds of the raw grain. These American cereals may be used for all the varied purposes to which farinaceous foods are usually applied. The English agent for their sale is Mr. B. Lampe, 44, Great Tower Street, E.C.

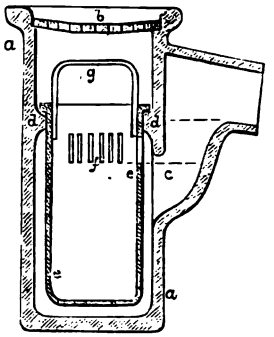
THE POLLUTION OF THE LOWER THAMES.—In the annual report of the Plumstead District Board of Works just issued, we find particulars of a scheme, estimated to cost £20,000, for the drainage of New Eltham, a parish within the Metropolitan area, into the sewer just constructed by the West Kent Sewerage Board. It is also proposed to drain a large number of houses at South Lee (likewise within the Metropolis) into the West Kent sewer. This will be the first instance of any portion of the Metropolis being drained into a sewer which is not under the control of the Metropolitan Board of Works, and a correspondence is being carried on between the latter Board and the District Board, with a view of obviating the ratepayers of New Eltham and South Lee having to pay claims from the two Sewer Boards, each having power to levy a sewer rate. This diversion of sewage will tend to relieve the overcharged southern outfall sewer at Crossness. The New West Kent drainage area is a very large one, including Bromley, Beckenham, the Crays, and a considerable portion of West Kent; and when the scheme is complete, it will bring a large accession of sewage into the already overpolluted Thames, the West Kent sewer outfall being off Dartford.

The Dwellings Committee of the Charity Organisation Society have just issued a report, from which we learn that about thirty-one million pounds are now in the hands of 876 building societies in all parts of the kingdom. The Committee also state that the influence of cheap railway communication induces artisans to obtain houses in the suburbs through these societies. During the inquiry, instances were given of workmen earning only ordinary wages, becoming, by means of the societies, possessors of the houses they occupy.

Mr. H. Greaves has been appointed Medical Officer of Health for the Ashbourne Urban Sanitary District for the ensuing year; and Mr. Samuel Raby has been elected a member of the St. Mary Church Local Board and Urban Sanitary Authority, Devon, *vice* Bartlett, resigned.

ILLUSTRATED SANITARY PAT

1366. (1881.) TRAP FOR DRAINS AND SE
W. HAGEN AND G. C. A. KRIGG, KINGSTON-UP
(4d.)—The object of this invention is to arrest a
any solid matter from passing into drains or sewe
construction and action will be seen below. *a* i



of the trap in the form of a well, and of suitabl
horizontal section; *b* the grid or grating; *c* i
opening to which is attached the usual curved syp
to form communication with the drain or sewer
projecting rim above the opening *c*, and *e* is the r
case or lining; *f* the perforations in the case or
and *g* the handle. From this construction of tr
be evident that all matters passing through th
grating *b* will fall into the inner trap or lining *c*,
all liquid will pass out through the side perforatio
thence through the side opening *c* and syphon pi
drain or sewer, whilst all solid matters will be re
the inner trap or lining. When the latter becomes
partially so with solid matter it can, on raising th
grating *b*, be readily lifted out by its handle *g*, emp
replaced.

1429. (1881.) SANITARY RECEPTACLES A
PLIANCES. JOHN TURNER AND J. ROBERTSHAW.

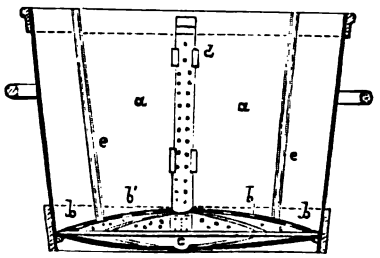


FIG. 1

FIG. 2

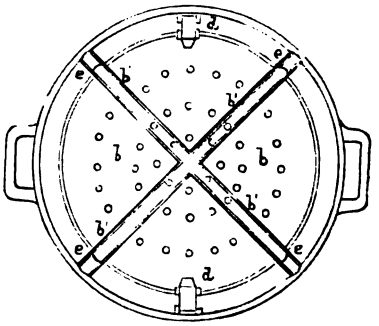


FIG 3

ISTER. [8d.]—This invention relates to improvements anitary pails or receptacles employed to contain and nsport offensive matters, as is well understood, and has its object to provide means to drain off any liquid thrown shot into the said pails or receptacles and allow it to r, divide and separate itself from the solid or partly d matters contained therein. Fig. 1 is a vertical section, l figs. 2 and 3 represent a side view and plan. The es represent a pail or receptacle *a* provided with forated false-bottom *b*, formed with channels b^1 and a an outlet *c* for the liquid. In this example the false-bottom *b* is of a convex form, but any suitable pe can be employed. The rim of the said false-bottom sts upon the bottom of the pail, which in the example ightly concave, a cavity or space being formed between two bottoms. The perforated side straps *d* are intended ssist in the filtration by taking away the liquid more lily that cannot get easily through the solid matters in pail, but the recesses or corrugations *e* built up at the t with a perforated plate may be employed either with vithout the said side straps *d*, which said straps rest ely on the false bottom, and can be quickly removed n the pail is to be emptied of its contents.

432. (1881.) DEODORIZING WATERCLOSETS. W. RGANS, REDLAND, BRISTOL. [6d.]—This invention tes partly to water-closets, commodes, bed-pans, etc., it can also be made applicable to the removal of lls generally in hospitals. The sketches represent a

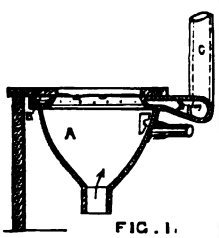


FIG. 1.

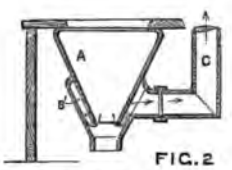


FIG. 2

er-closet according to one mode of carrying out the in- tion. In the upper part of the pan A of the closet is ollow ring B, which is perforated with small holes, as wn at *a*, communicating with the interior of the pan, is connected to an ascending pipe, C, in which, or in nection with which, a gas burner or oil lamp is placed. ring the time that the burner is alight or any exhaust is ction, a draught is maintained in the pipe C, so that when closet is used the effluvia from the pans A are drawn ugh the perforations *a* or the slots or openings in the ow ring B into the ascending pipe C, whence they may lischarged into a flue or beneath the eaves of the roof he house, the pipe being carried up to a sufficient ele- on. The flushing rim with which the pans of water- ets are frequently formed for the admission of the water flushing the closet, may, by making the same of suitable ional area, be utilised for the outlet of the effluvia or ious gases. In this case a valve or similar device may provided in the pipe, between the burner or lamp and pan, and arranged to be closed by the same action as by which the flushing water is admitted, whilst a valve be simultaneously opened for the supply of air to the ne during the flushing operations. Or the flushing rim be simply connected with the exhaust pipe C, as before cribed. According to a modification of the preceding ngement, which is illustrated in Fig. 2, the inventor vides an annular space or chamber B^1 around the lower of the pan A of the closet, with which space or chamber exhaust pipe C is in communication, the gases being caused to pass from the lower part of the pan into the e or chamber B^1, whence they are drawn off by the on of the exhaust.

440. (1881). PREVENTING KITCHEN-BOILER EX- SIONS, ETC.: B. GILES, BLACKHEATH, KENT. [6d.] he object of this invention is to provide against the ger which arises from the overheating of kitchen and r domestic boilers when the water in the supply or other circulating pipes is frozen or the supply or circulating pipes are corroded. In these Figs. A is the boiler of the range, into the top of which is fitted a short tube or collar B communicating with the water spaces. Screwed into this tube is an inverted hollow cone C, which is closed by a metal cap piece D of peculiar construction, which it is intended shall resist a given pressure of steam, and give way under an excess of pressure in the boiler; this safety apparatus is shown in vertical section at full size at Fig. 2. A portion of the cap piece D is rendered, by hammering, so brittle as to ensure it giving way. The cap piece D is made preferably of thin sheet copper, forming a concave on its upper

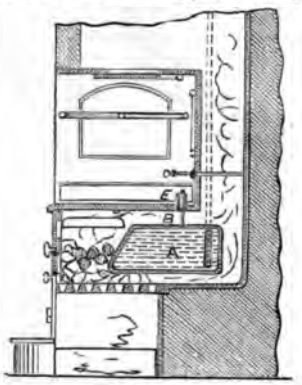


FIG. 1.

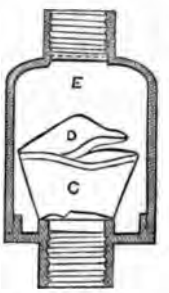


FIG.2.

face, as shown at Fig. 3, and bending over its edge so as to form a flange, which is attached by solder to the cone C. The cap piece D will thus present a convex face to the water, and will be sufficiently stiff to resist the upward pressure of the water in the boiler until it rises to a dangerous height. Supposing the cap piece D to be made so as to yield to a certain pressure, the moment that pressure is reached, instead of continuing to present a convex face to the water the cap piece will be thrust outwards; and, since the metal is made brittle by hammering, the buckling will rupture the cap piece and cause it to take a form somewhat like that shown in Fig. 2, thus providing an escape for the steam and water, and preventing an explosion. In order to prevent the steam and water being discharged into the kitchen containing the boiler when a rupture of the cap piece takes place, the safety apparatus may be enclosed in a water-tight metal box fitted with a pipe leading to the outside of the building. This box is shown at E as screwed to a flange carried by the tube B, and into the top of the box the discharge pipe F is screwed. It will be understood that, on removing the water-tight box E from the tube B, the cap piece D can easily be renewed after it has been ruptured.

1457. (1881). IMPROVEMENTS IN VENTILATING APPARATUS: R. H. REEVES, PARKHURST, ISLE OF WIGHT. [6d.]—This invention has reference to improvements on that class of ventilating apparatus for which letters patent were granted to him on the 28th March 1874 (No. 1080). In carrying out his present improvements, he forms the front plate with corrugations and openings through it, the sides of which taper inwards from the front plate, so that these openings are somewhat smaller at their inner than at their outer end. Fig. 1 shows a sectional view of parts of one portion of the apparatus; figs. 2 and 3 are opposite face views of the same. *a*, *a*, represent the front plate with openings a^1, a^1, through it, and it will be observed that these openings a^1 taper slightly inwards, so that the openings a^1 are smaller or contracted at their inner ends than at the front or outer ends; *b*, *b*, are recessed chambers arranged to be opposite the inner ends of these openings a^1. These chambers *b* are formed with corrugated sides b^1, and there are spaces *c*, *c*, between these chambers *b* and the inner ends of the taper openings a^1, as well as between the inner edges of these chambers *b* and the inner corrugated surfaces of the front plate *a*. Between neighbouring re-

cessed chambers *b*, *b*, there are provided other somewhat conically or inverted-bell shaped pieces *d* with corrugated surfaces d^1, and these pieces *d* are applied so as to be capable of movement to and fro, as indicated by the dotted lines d^*, in order when desired to close or regulate the ex-

FIG. 1.

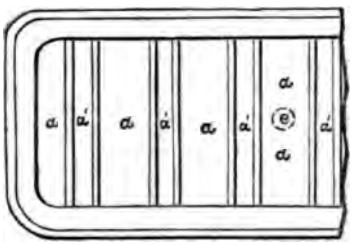


FIG. 2.

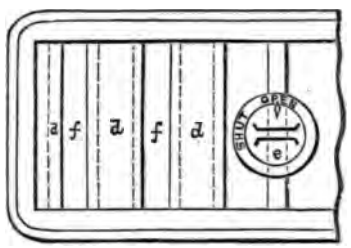


FIG. 3.

tent of opening of the passages through the apparatus. This regulation may be effected by a screw *e* or otherwise. In use when the parts of the apparatus are open, air passes through the apparatus by the taper openings a^1 in the front plate *a*, and, impinging on the corrugated surface of the inside of the chambers *b*, is divided, and any damp in such air then becomes absorbed or removed, and that air is thence conducted back in the spaces *e* between the chambers *b* and the sides next thereto of the taper openings a^1 against the inner and corrugated surface of the front plate *a*, and by these corrugations the air is deflected again through the passages *f* between the outside of the chambers *b* and the conical or inverted bell shaped adjustable pieces *d*. In some cases the outer plate *a*, or an inner plate thereto, may be moveable so as to close or regulate the flow of air as desired through the apparatus, as indicated by the dotted lines *g*.

1473. (1881). SYPHON BOXES OR TRAPS FOR DRAINS: G. B. JERRAM, C.E., WALTHAMSTOW, ESSEX. [6d.]—The chief part of the invention relates to syphon boxes or traps for preventing the entrance of sewer gas into house drains, and for other such like purposes. Figs. 1 to 5 of the drawings illustrate a syphon box, fig. 1 being a longitudinal section, fig. 2 a plan with grating or cover removed, fig. 3 a horizontal section at Z, Z, in fig. 1, and figs. 4 and 5 respectively vertical transverse sections on lines Y, Y, and X, X, of fig. 1. Similar letters refer to like parts in all the figs. from 1 to 5. This invention consists in forming such syphon boxes with a curved depressed portion A at or about the middle of the length of the concave bottom, and adapting a loose cross partition B to slide in guides C, C, formed on the internal sides of the syphon box D; the lower end of the partition enters the depression A in the bottom, so as to form a dip piece or liquid lute when the said depression contains water, sewage, or other liquid. The aforesaid partition B may be made gas-tight in the guides C, C, by means of packing. The inlet and outlet pipes E, E, may be arranged to enter the syphon box or trap D at any convenient point, and the top be covered with a grating F, or in any other suitable manner, which will allow of the escape of gas from the syphon box; for example, instead of a grating a close cover with a pipe carried to any required height may be employed. By this arrangement the syphon box or trap can be cleaned out

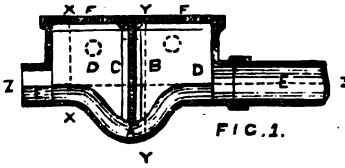


FIG. 1.

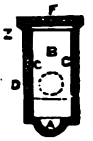


FIG. 4.

FIG. 2.

FIG. 5.

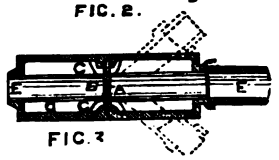
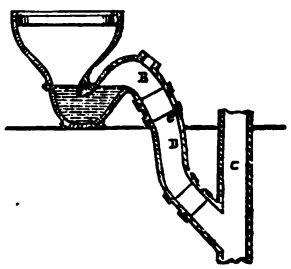


FIG. 3

with facility, and when the partition B is removed, the inlet and outlet pipes E, E, can easily be got at for the insertion of a cane. In the arrangements heretofore in use these operations have been difficult without taking out the syphon or pipes. Here it is only necessary to remove the cover and partition from the syphon box in order to enable these operations to be performed, and the syphon box thus serves the combined purposes of a ventilator for the sewer, a fresh air inlet to the pipes under the house, a syphon trap, and an inspection box.

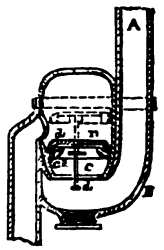
AMERICAN PATENTS.

245,196. WATER-CLOSET: HENRY C. MERER, NEW YORK, N.Y. Filed March 5, 1881. Issued August 2, 1881.—*Claim.*—In combination with the trap-like portion B of the earthenware bowl, and a flexible metal connecting



pipe D, adapted to connect the closet with the soil pipe, a metallic ferrule-like device *e*, adapted to be connected at one end to the part B, as described, and to be soldered at its other end to the said flexible pipe D, as and for the purpose set forth.

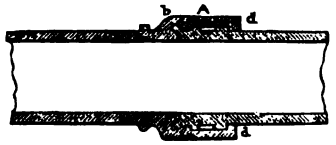
245,213. SEAL-TRAP: DENNIS A. RAGAN, PHILADELPHIA, PA. Filed February 3, 1881. (Model.) Issued



August 2, 1881.—*Claim* 1. In combination with the bowl C, having mercury-groove C^2, the disk or valve D having

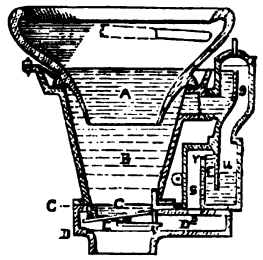
flange *d* and stem d^1, substantially as shown. bination with bowl C having mercury-groove c^2 D, having stem d^1, the strainer G, affording a r said stem, and protecting said groove from bstantially as shown. 3. The combination with , of trap B, iron bowl C having mercury-groove , valve D, having flange *d*, and stem d^1, and substantially as shown and described.

. PIPE-JOINT: ALEXANDER R. ROBB, BROOK- . Filed May 27, 1881. Issued August 2, 1881. In a pipe-coupling, the combination of the



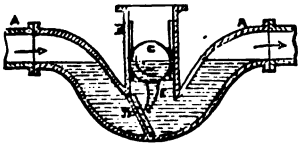
aving at its shoulder a convex projection *b*, and lugs *a*, *a*, *a*, with the entering pipe B having a ing *c*, and spirally arranged projections, *d*, *g*, lly as and for the purpose described.

. WATER-CLOSET: JOHN ROBERTSON, MONT- EBEC, CANADA. Filed April 6, 1881. (Model.) ugust 9, 1881. *Claim* 1. In a water-closet, nation of the swinging valve E with the vibrating rm *e*, and with the annular packing C, having



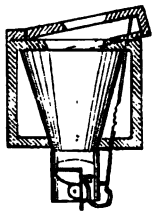
ower face, all arranged so that the valve will be he arm *e*, and wedged between the inclined seat e arm *e*, when carried beneath the seat, as herein . The combination of the swinging valve E, apable of vibrating on its stem d, with the pin *b*, anks or jibs *c* and *f*, link *g*, and weighted lever F, as herein shown. 3. The chamber B, flange *a*, in combination with the packing C, valve-seat that is oblique to the line of the with the chamber D having extension D^2, and alve E, all arranged as specified. 4. In a water- ing a vibrating valve E, which is adapted to r the annular packing C, which is beneath the e combination of the intermediate chamber B ipe *s*, and partitions *t*, *u*, *v*, all arranged so that continuous passage between the chamber B and h or extension D^2 and the soil pipe, and so, also, ater must seal said pipe *s*, whenever the valve E y closed, as herein shown and described. 5. The on of the lever *f*, having pin K, with the rock- aving crank *l* and lip *r* thereon, and with the crank *o*, all arranged so that by vibrating the e shaft H will first be rocked in one direction in the opposite direction, substantially as herein l described.

. TRAP: JOHN T. TITUS, SAN FRANCISCO, iled March 10, 1881. (No model.) Issued 6, 1881. *Claim* 1. In a side sewer, drain, or e A, the semi-circular bend or water-trap K, e vertical tube or chamber B above its lower provided with a valve-seat around the opening, nnects the house side of the sewer with the in combination with an angular valve, stopper , which is connected with a ball or float C, by a y means of which the float is dropped, and held upon its seat in an angular position across the passage, so that it will be opened automatically by water passing from



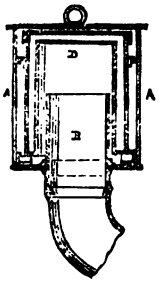
the house to the main sewer, but be pressed more firmly upon its seat by any pressure coming from the main sewer, substantially as described.

246,129. CLOSET-SEAT: JOHN P. HANNON, PITTS- BURG, PA. Filed March 26, 1881. Issued August 23, 1881. *Claim.*—In a closet, the combination of an open bottom hopper or bowl, a pivoted valve, arranged in or on



the open bottom of the hopper, and adapted to close the same, and a spring rod attached at one end to the pivoted valve, and at the other to the hinged operating device, as and for the purpose specified.

246,193. SEWER-TRAP: JAMES F. O'GRADY, CHICAGO, ILLINOIS. Filed June 11, 1881. Issued August 23, 1881. *Claim.*—The combination, with the receiver A and the



discharging vessel B, rising within the same, of the gas-cap D, and its disinfectant-chamber *d*, substantially as specified.

Returns laid before the Birmingham Town Council by the Improvement Committee give the following particulars of the sanitary work done under the scheme since 1875, when active operations began:—Buildings thoroughly repaired and made healthy, 529; closet accommodation, etc., provided, 354; courts newly paved, 89; houses, etc., temporarily repaired, 2,263; open spaces enclosed, 24; courts wholly or partly drained, 345; water supply in courts—wells closed, 16; repairs to water-supply fittings, 380; dilapidated and insanitary buildings taken down, 571; buildings removed to clear land for letting, 54; buildings removed for ventilation of courts, 29; number of artisan tenants displaced, 137. Altogether, 609 buildings have been removed since the operations of the scheme began.

At a special meeting of the Dorking Local Board, the surveyor (Mr. Matthews) presented a scheme for the sewering of the town. The surveyor proposes to adopt the chemical precipitating method of dealing with the sewage, of which the first cost will be about £10,000. In coming to this conclusion the surveyor seems to have been guided to some extent by what he saw at Taunton, where the chemical precipitation process is successfully worked.

LAW REPORTS.

Informality in Vaccination Prosecutions.

At Worship Street, the Vestry of the parish of St. Leonard's, Shoreditch, by Mr. Smith, their officer, prosecuted several persons, parents of children, for non-compliance with the requirements of the Vaccination Act. In consequence of the recent outbreak of small-pox, a very strict investigation of the condition of families was made in the district, the result being the discovery that a number of children, in some cases six or seven years old, were unvaccinated. Proceedings were taken in some cases where the parents had neglected the matter after notice, but then the magistrate decided that the prosecutions had been wrongly commenced, proceedings for penalties for non-observance of the law being limited to the first fifteen months of an infant's life. The result was that all the summonses were dismissed. In the present instance, the parents of children of four years old and upwards, had been summoned under a different section of the Act, which gives power to the magistrate to make an order for the vaccination, and then in default the parents could, on subsequent proceedings, be fined. There was, however, no opposition on the part of the defendants. In some cases orders were made, some summonses were withdrawn, and some adjourned, on the request of the parents, while the operation was performed.

Assessments by Water Companies.

In this case, the Grand Junction Water Works Company appeared (through their officers), in answer to an adjourned summons taken out against them by Mr. Dobbs, a barrister-at-law, for making a claim for the sum of £4 10s. upon him, being the amount alleged to be due to the said company for two quarters' supply of water at 34, Westbourne Park, to Michaelmas, 1881, which claim as to part thereof was based upon an annual value of £140. The plaintiff contended that such annual value should be taken at £118, being the amount at which the premises were assessed to the poor rate. The contention in the case is, that the water-rate must be charged on the rateable value to the poors' rate, and not on the gross value on rent. That as the former in amount is about one-sixth less than the latter, the case is of vast importance to all ratepayers and water companies in the kingdom. Mr. Cooke, the magistrate, gave a very elaborate decision, arriving at the conclusion that there was no reason why the company should alter the amount they claimed from Mr. Dobbs, and the summons was dismissed, £5 5s. being allowed for costs to the defendants.

Small-Pox Patients in Public Vehicles.

A young man named Lilly was charged at the Lambeth Police Court, for travelling by a tramcar to the hospital, when he was suffering from small-pox. As the magistrate did not believe that the defendant had acted wilfully, he ordered him to pay a fine of two shillings only and costs, but pointed out that it should be publicly known, that parties suffering from such infectious complaints should keep out of public vehicles.

The Isolation of Infectious Diseases.

Charles Hiscock, of Plaistow, was summoned by the West Ham Local Board for disobeying an order that he, when suffering from small-pox, should be conveyed to a small-pox hospital. William Horn, the sanitary inspector, proved the defendant's refusal to comply with the order, although he, his wife, and infant child were suffering from small-pox at the time. The dimensions of the room in which they were all ill were 1,000 cubic feet only, whereas the Poor Laws required 1,200 feet for each person. The child had since died. The magistrate, Mr. Phillips, remarked upon the importance of isolation in such cases, but as the Local Board did not wish to press the charge, he inflicted a fine of ten shillings only.

NOTICES OF MEETING

BERLIN SANITARY EXHIBIT

The Exhibition which is to be held in 18 special patronage of the Empress and the C will include all scientific modern appliances servation of health and the saving of life. ventors are solicited to contribute, so that as articles as possible may be brought before public. Among the forty groups of exhi named, Ground, foundation, and atmosph ways, and open thoroughfares; Methods of r utilising street refuse; Water-supply; Mark Schools, dwelling-houses, and public institut factories liable to danger and insalubrity dwellings; Food; Railways; River and sea ing apparel; Infectious diseases; Saving li Protection against inundations, explosions, sistance to sick and wounded persons, whet from the accidents of peace or the casualties o

SANITARY INSTITUTE OF GREAT

At a meeting held Dec. 22, 1881, G. J. Sym in the chair, the Secretary read a list of don Library, and Dr. G. D'Arcy Adams was elec of the Institute; two Members were also application read for ballot at next meeting.

SOCIETY OF MEDICAL OFFICERS OF

The next meeting will be held on Friday, Ja at 7.30 p m. The Council will present a re various duties imposed on the Medical Officer o some large towns. At 8 o'clock precisely, Dr. ing will read a paper on 'The practical worki Vaccination from the Calf.' Members are re influence any of their friends, who may be election, to join the Society, either as Ordinary or as Associates.

NOTES AND QUERIES.

Having for some time back been in the receipt of Que taining strictly to sanitary work, and which it would be easy without having to refer our correspondent to competent p advisers, we have opened a column in which to register such Q Replies thereto as can fairly be expected from us; and our s and readers are invited to make such use of this column a to benefit themselves and the community. Both Queries an will be subjected, if unnecessarily long, to a strict curtailment

1. Sanitary Certificates.

I wish to obtain a certificate of efficiency from the Sanitary of Great Britain. Will you kindly inform me where instructions.

[Apply to W. White Wallis, Esq., Secretary of the Institute, Conduit Street, W.]

2. Smoke Abatement.

Dr. Hinckes Bird writes to us, in reference to the Smoke A Exhibition, that he has tried many of the appliances sho for the consumption of smoke and economy of fuel, and t them all unsatisfactory with the exception of a gas stove, which was provided with an exhaust cowl above, and plent air below. Recognising, however, that many contrivanc at South Kensington 'are unquestionably excellently a the wants of the largest coal-burning city in the w Bird is of opinion that, unless the Kyrle and Nation Societies can organise an enlightened public opinion on th or induce the Government to take up the question, it is to that the apathy of the public will prevent any of the provided from being applied to many of the existing m grates in London. Dr. Bird 'points out the new and feature of the Exhibition', in that as all 'competit furnaces, and fire-places are to be subjected to a really sc thorough examination as to their various capabilities, recommends that fires should be made up as follows i fire-place to be found in most houses:—'The fire of best coal is lighted in the usual way with a small country fa vernacular, "bobbin", or resinized wheel, two large fi being placed on the bottom of the grate to keep the ma and to allow all possible access of air; the fire should n but fed through the bars by the shovel or tongs, the being judiciously placed, with occasional blocks of sh the top: a cheerful Turneresquely-tinted fire, with little is the result.'

ORIGINAL PAPERS.

POX HOSPITALS AND SMALL-POX.

ALEXANDER COLLIE, M.R.C.P. Lond.,
Medical Officer, Fever Hospital, Homerton.

t number of the SANITARY RECORD there
r from Dr. Tripe, upon which I desire to
ew observations. I did not say that epi-
l been compared with non-epidemic years;
he years 1861-70, which were 'relatively'
free years, had been compared with the years
n which there were three severe epidemics.
'relatively', which qualifies epidemic, and
the whole sentence, is overlooked.
d be useless to spend time in discussing
meaning of the word epidemic, and I do
fore, intend to take exception to Dr. Tripe
ays there were three epidemics in London
rs 1861-70. But granting this, there is no
doubt that there was a great deal more
in London in the years 1871-80 than in
1861-70.

year 1863 the deaths in London were	..	..	..	2,012
year 1866 they were ..	..	..	..	1,388
the year 1867 they were	..	..	..	1,332
ogether a total of	..	..	..	4,732

e epidemic years. Now in the epidemic
one there were 7,876 deaths, or very nearly
many as there were in the whole three of
nium 1861-70. In Hackney the increase
marked than in London, for in the years
ere were only 146 deaths from small-pox
y, whereas in the years 1871-80, excluding
the small-pox hospitals not belonging to
there were 1,125; and if we take the mor-
e about 20 per cent., this would give 730
he decennium 1861-70, to 5,625 in the
1871-80. This, I submit, justifies the
of my statement that the years 1861-70, as
with the years 1871-80, were 'relatively
ree years'. My statement, moreover, had
reference to Hackney, and was, for the
f my observations, founded, not on the
General's returns, but on Dr. Tripe's maps.
e next finds fault with my statement that
pox Hospital was opened in February 1880
est of the Hackney Board of Guardians.
ning Dr. Tripe may attach to the word
I do not know; but it is absolutely true
ly the Hackney Board of Guardians, but
ey Sanitary Committee and Dr. Tripe
d for some time before it was opened, been
t' that it should be opened, because small-
d in Hackney and in the vicinity of the
s the following letters will show:—

tober 1879' [thirty-four days after the hospital
osed].—'I am directed, etc., to forward report
rtle, etc. (Signed), John Godwin, Clerk,'
uardians].

tober 1879' [thirty-one days after the hospital
losed].—'I think it my duty to inform you of
nd expense that is being incurred in the second
he occurrence of small-pox cases' [Dr. Tripe
r to the RECORD said there were none] 'of
y as to warrant my refusing to certify for their
o great a distance as Deptford. I have now
der treatment, the first, Ann McDonald, living
r Rushmore Road' [just on the quarter mile
as attacked by the disease in a semi-confluent
after her confinement; she was quite destitute
be supplied with a nurse, nourishment, etc.

The second case that of a woman named Curtis of 55, Brooksby's Walk [within about forty feet of the small-pox mortuary, in the house of a laundress, the patient in this case being the collector of the linen to be washed], suffering from the disease in a confluent form and is still very ill.

'Both these cases having to be kept at home, in neighbourhoods thickly populated, and, in the case of McDonald, with three families in the house [significant as to the status and general sanitary condition of the vicinity of the hospital and explanatory of much], gives one reason to fear the further spread of the disease [of course, duplicate families, just what we say]. '(Signed), James H. Turtle, M.D.'

So much for Dr. Turtle. He has established for us the fact that cases of small-pox did exist (I never said they were 'rife', as Dr. Tripe makes me) in the *vicinity* of the hospital when it was closed, and during the time in which Dr. Tripe said 'there was not a single case in the immediate vicinity of the hospital until about six weeks after it was opened'.

Let us now hear Dr. Tripe himself:—

'November 8th, 1879' [fifty days after the hospital had been closed].—'I am directed by the Sanitary Committee for the Hackney District to express their great regret at the closing of the Homerton Hospital against small-pox patients.' [Why, if it be a danger to the district?] 'There has been a rather large number of cases of this disease in the district within the last month' [hospital having been closed fifty days before date of letter], 'and two have no been removed in consequence of the medical attendants being of opinion that they could not bear the fatigue of so long a journey as that to the Stockwell Hospital' [should be Deptford Hospital]. 'In another instance the patient was retained for nearly a fortnight in a small house' [Rushmore Road, just on the quarter mile radius], 'with another family therein for the same reason. The Committee also desire to state that as the inhabitants of the district, during epidemic periods, are subject to the risk attendant upon the removal of infected persons to and from the hospital, and as undoubtedly the residents in many' [not all then! Now what is the difference between the 'many' streets in which small-pox occurs and the 'some' in which it does not, both 'many' and 'some' being in the vicinity of the hospital?] 'of the streets near the hospital have suffered to a greater extent from small-pox than in most other localities of the district, they are of opinion that the hospital should at all times be left open for the reception of patients from this district.' [At all times! Why? Because there is always small-pox, whether the hospital be open or not. Clearly. This is exactly what we say and why we placed the hospital where it is. Cannot, moreover, be much of a danger if it be requested that it be always open]. 'They are aware there would be some additional expense caused by the treatment of small-pox cases in a detached building on the upper floor of the same building with those who are suffering from typhoid fever' [Thought small-pox hospital was a danger to the houses in its vicinity, and yet Dr. Tripe proposes to place a small-pox hospital inside a fever one!], 'but they trust that this will not prevent the re-opening of the Homerton Hospital for small-pox patients at the earliest possible period. I may also add, for myself, that patients who are removed when suffering from confluent or hiemorrhagic' [*sic*] 'small-pox must run greater risk from a long than from a short journey; and as I am informed that a very considerable proportion of those now attacked suffer from this form of disease, it becomes a matter for serious consideration if this additional danger should be incurred. I would also point out the risk of infection to the frequenters of the streets, in the central parts of London, by the frequent passage of ambulances through their midst from all the eastern parishes of the Metropolis.' [Risks never discovered until the Asylums Board was created.] *

So far Dr. Tripe. Whatever be his interpretation

* Since this paper was written, I learn from Dr. McCombie that during October and November 1879, other cases were received at his hospital; one from Homerton Fever Hospital, one from City of London Union, one from High Street, one from Churchill Road, one from Rosina Street, all in the immediate vicinity of the Hospital!

of what constitutes a request, it will be evident that the Hackney Board of Guardians and Dr. Turtle, the Hackney Sanitary Committee and Dr. Tripe, desired the Homerton Small-pox Hospital to be opened; the former because small-pox existed in the immediate vicinity, notwithstanding Dr. Tripe's assertion to the contrary, the cases being of such severity that they could not be moved a long distance, and the latter because small-pox, in its worst form, existed in Hackney.

I now come to the statement relating to the Homerton Training College. Dr. Tripe says 'one would imagine that no cases had occurred there in 1877, but it is a fact that two cases were removed in that year from the college to the Highgate Hospital'. Now this is not a fact at all. There were, in all, in the years 1871-80, three cases of small-pox in the college, two in November 1876, which could not be traced, and one in 1878, which was traced to Manchester. The further statement that 'singularly free' would lead one to imagine absolutely free, or simply free, appears to me to be a self-evident misinterpretation; but inasmuch as the words are the words of Principal Liddell, written in my draft report with his own hand, I leave their defence to him.

Dr. Tripe makes me say that 'as many cases occurred round some of the Board Schools as round the hospital'. I never said anything of the kind. What I did say was—'Dr. Tripe might have maintained with reason that the Board Schools spread small-pox, because within the quarter-mile radius of each group of small-pox deaths, marked on Dr. Tripe's map, there is a Board School.' A very different statement, I think; although the Board Schools are more likely to spread the disease than the Hospital, to my thinking. As a matter of fact, there are at present no means of knowing how many cases have occurred around the Board Schools or around the hospitals, as Dr. Tripe himself admitted in his appendix to the Hackney memorial, when he said, 'These figures are necessarily calculated on the deaths, as cases in respectable houses are rarely reported to me, and the calculations would consequently be misleading.'

From this, as I argued at length in my observations, it will be seen that Dr. Tripe was not in a position to form any conclusion as to the liability, greater or less, of the vicinity of the Small-pox Hospital to small-pox as compared with other districts, simply because he had no knowledge of *all* the cases. He only knew of such poor cases as were reported to him; and as the majority of the cases in the vicinity of the hospital would be poor cases, necessarily there would be more cases reported to him from the vicinity of the hospital than from other places beyond the quarter-mile radius. It would have been useless, then, to apply to Dr. Tripe for information which confessedly he did not possess. It is not improbable that the medical officers of the Homerton Hospitals, living as they do in the very place, receiving the majority, if, indeed, not all, of the cases reported to Dr. Tripe, and not infrequently consulted by persons in the neighbourhood, know more about the incidence of infectious disease than he might imagine.

Exception is taken to the manner in which I treat Dr. Tripe's statistics, which I am made to say 'are valueless'. I never said anything of the kind, because I had not gone into them minutely. Having, as I thought, shown that the two premisses which formed the foundation of the Hackney memorialists' case were wrong, I did not think it necessary to go into the details. But I had no conception, when I wrote my observations, how far wrong they really were, and how groundless were the conclusions which Dr. Tripe had arrived at. As a specimen of one of many blunders, let us take the following:—In the years 1861-70, says Dr. Tripe, the deaths per 100,000 inhabitants in London were 28 as against 17 in Hackney; whereas in the Appendix of the Report sent to the Asylums Board managers, the figures are 17 and 28 per 1,000; and neither the 1,000 nor the 100,000 are correct. So in the years 1871-80, the death-rate in Hackney is said to be 64 per 100,000, both of which are wrong. What value is one to attach to statistics of this sort?

In these instances one may object that they are merely clerical, and do not alter the substantial facts. Very good. Let us take another, and in this other is the gist of Dr. Tripe's case. If it can be shown that this other is baseless, Dr. Tripe's whole case crumbles to the ground. Consider the statistical summary which follows:—

Summary for the ten years 1871-80.
(According to Dr. Tripe.)

	Annual Number per 1000 population. Deaths.	Cases.
In streets adjacent to the Hospital	4.1	12.1
In streets with a quarter-mile radius, including the above-mentioned streets	2.45	9.1
Amongst 30,177 other persons living in small houses	1.60	5.7

Here Dr. Tripe shows by *his* statistics, that persons within a certain radius are liable to small-pox in proportion to their proximity to the hospital. But how is this arrived at? By omitting altogether half the adjacent population; to wit, the migratory populations of the Homerton Fever Hospital, which, excluding about 3,000 small-pox patients, during the ten years 1871-80, numbered about 7,000, and the population of the City of London Union. It will be obvious that by procedure of this sort any result may be obtained which the operator may desire. Let us see what the statistical summary will tell us with this correction.

Statistical summary as it should be:—

A. Streets adjacent	0.9
B. Within quarter-mile radius ...	1.1
C. 30,177 others, etc.	1.8

As regards the cases, it is not necessary to take any notice of *them*, because they are only, according to Dr. Tripe himself, a fraction of the whole, to wit, cases which happened to be reported to him, not all the cases which occurred in the district, *e.g.*, cases which occurred in the Fever Hospital, and in 'respectable houses'. So much for the statistical summary; when put a little on its legs it is not so valueless after all.

I now come to the death-rate which, Dr. Tripe says, is not referred to in my answer. To begin with, Dr. Tripe's figures were in great confusion, and moreover, there was nothing in them which I was called upon to answer. What Dr. Tripe's figures showed was, that there was more small-pox in Hackney in the years 1871-80 than in the years 1861-70. I never denied that—on the contrary I admitted it. I said definitely that small-pox was on the increase everywhere, as Dr. Tripe's maps clearly showed, in Hackney, and that the vicinity of the Small-pox Hospital, therefore, could not be expected to be an exception. The Hackney memorialists, on the other hand, contended, in effect, that notwithstanding this general prevalence of small-pox everywhere in Hackney, the vicinity of the hospital should be an exception, a proposition which I said was a 'self-evident absurdity'.

Dr. Tripe denies that the route by High Street

and the Grove, was adopted at his suggestion. As regards this statement, I have no objection to admitting that Dr. Tripe is technically correct, although my information was as I stated it; but my objection in principle, applies to his alternative routes, neither of which, by the way, could be adopted, in one case because of a brick wall, in the other because of two houses. There remained in default of these the one I mentioned. It is true that the managers, at the risk of being called in question by Dr. Tripe's vestry, might have spent a few hundred pounds, in order that the 'infectious' ambulances might make a longer journey, and pass through crowded streets instead of an unfrequented lane. That this proposition was actually made is an example of the extremities to which people can be driven by their 'hobbies', and a fine example of the frivolous pretences upon which public money is sometimes spent upon what are called sanitary improvements.

Dr. Tripe's remaining statements will not detain us very long. The first is, that the Small-pox Hospital at Homerton is constructed in a manner which, two years ago, I should have said to be 'highly objectionable'; in my paper, 'Management of Small-pox Hospitals', I never said anything of the sort. In dealing with small-pox hospitals from a public health point of view, I made suggestions whereby objections which had been made to small-pox hospitals might in my opinion, be remedied; but I never said that my arrangement was the only possible one, or that any existing small-pox hospitals were objectionable. To say that one kind of arrangement would satisfy timid people, and that another kind is 'highly objectionable', are two, I think, quite different things. (2) This has been shown to be erroneous, and the (3) irrelevant. This takes us to (4) the most important of all.

'That the disease was persistently present in the vicinity of the hospital during the whole of the ten years it was open, whilst in other localities, although a severe outbreak occasionally occurred, it did not prevail year after year in the same way as around the hospital.'

There are here, it will be observed, two distinct declarations: the first, that the Small-pox Hospital was open for ten years, and the second, that 'year after year', of these ten years, small-pox existed in the vicinity. Now during these ten years, the Small-pox Hospital has been closed for small-pox on three different occasions, (*a*) from September 1874 to June 1876, a period of about twenty-one consecutive months; (*b*) from July 1878 to March 1879, a period of about eight months, and (*c*) from September 1879 to February 1880, a period of about four months, making altogether nearly three years; and still 'year after year' during the whole of these years, both when the hospital was present and when it was absent, small-pox existed in the vicinity.

Dr. Tripe might here object that my interpretation was not a fair one, inasmuch as he only meant to say that the small-pox existed in the vicinity of the hospital during those portions of the ten years (1871-80) that the hospital was open for small-pox. This interpretation, however, is rendered impossible by the sentence which follows: '(5) That when the hospital was closed, the number of cases was not so great [but some there were] as in some other streets, and that small-pox returned very soon after the hospital was re-opened'. That there is a relationship of cause and effect between a small-pox hospital and small-pox in its vicinity will be obvious, but here at Homerton the small-pox, almost constantly present in a community whose sanitary surroundings are in many ways deplorable, is the cause, the hospital the effect. A moment's consideration will show that as the Homerton Small-pox Hospital would not be opened unless there were cases from the district near to or remote from the hospital to put in it, necessarily, there would be, and always must be, a direct correspondence between the cases in the hospital and the cases in the district. For if there were few cases in the district there would be few cases in the hospital; if there were many cases in the district there would, also, be many cases in the hospital. And if there were none at all in the hospital, the number of cases in the vicinity of the hospital near to, or remote from it, would be obviously much less than when the hospital was full. To say, then, that when the hospital is closed there is less small-pox in the neighbourhood than when it is open, is to state a truism, so patent, that it is difficult to conceive how anyone could fail to see it.

SANITARY NOTES

ON MATERIALS USED IN CONSTRUCTING HOSPITALS, INFIRMARIES, AND PUBLIC INSTITUTIONS.

BY

A FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

I.—INTRODUCTORY.

IT is somewhat curious that, although in the model by-laws issued, by the Local Government Board, for the use of Sanitary Authorities, No. 10 provides that 'Every person who shall erect a new domestic building, shall cause the whole ground surface or site of such building to be properly asphalted, or covered with a layer of good cement concrete, rammed solid at least six inches thick,' the same beneficent provision does not apply to hospitals or workhouses.

In buildings where the sick and aged are housed it is especially desirable to make provision against the ascent of ground-air and damp. But in the large number of buildings erected hitherto the necessary precautions have been greatly neglected. Some of the houses in Upper Gower Street, London, University College, and University College Hospital stand upon the site of a pond or receptacle for night-soil and the refuse of the Metropolis. A well was dug through this soil, the water from which was so offensive that men were employed pumping continuously for several weeks to endeavour to get rid of the dirty supply.

Although the soil under a building may be dry, the building is still liable to be rendered unhealthy by the ground-air or air contained in the soil, and it is a mistake to suppose that because a building is erected on a porous soil it is necessarily healthy. It has been found that some sands contain a large amount of decomposing organic matter, which passes into both air and water and causes periodical fevers. Dryness is a great desideratum, but the very fact of a soil being porous may act prejudicially to health, owing to the greater facility for the transmission of air from impure sources even at a considerable distance. It may be assumed that the influences which cause movement of the ground-air are the temperature of the air, the ground temperature, the action of winds, rainfall, barometric pressure, and the change

of level of ground water. Ground-air contains a large amount of carbonic acid, and is generally charged with impurities from the emanations of decomposing organic matter. In winter time the ascent of the impure subsoil air is aided by the artificial warmth created within the building.

Pettenkofer says that remarkable testimony as to the permeability of the ground and of the foundation of houses, has been given by gas emanations into houses into which no gas was laid on; and mentions cases where persons were poisoned and killed by gas, which had to travel twenty feet under the street and then through the foundations, cellar, vaults, and flooring of the ground-floor rooms, thus showing how heated buildings will draw air through the ground on which they stand. A case in Munich is mentioned where not the least smell of gas could be detected in the street, but a great quantity of gas found its way into the ground-floor room of a house where no gas was laid on. It has been suggested by Dr. Stephen Smith of New York, that the most effective way of protecting a hospital against the dangers of ground-air would be by a system of ground ventilation, which would constantly withdraw from the soil all foul air and gases, and discharge them at such a distance from the ground as to prevent their return. For this purpose he suggests a heated shaft communicating by its base with drain pipes and conduits, leading to all parts of the ground at various depths. The shaft, which should be 150 feet high, might be the chimney of the boiler and other heating apparatus of the buildings. The superficial soil conduits should be very porous, to enable the air to enter them readily, the result anticipated by Dr. Smith being, that instead of the constant escape of the ground-air into the free air of the ground and into the basements of the buildings, the free air would be drawn into the ground and thence escape through the heated shaft, the process being one of constant purification of the soil.

The author of these Notes is not prepared to recommend Dr. Smith's scheme as one efficacious or practicable in its application to a large building and its site, but notices it as illustrating the importance attached to the subject by members of the medical profession who have given special attention to the question.

The necessity for the exclusion of damp from buildings need not be enlarged upon; it is universally admitted that damp buildings are the fruitful cause of such complaints as rheumatism, neuralgia, catarrh, and it is equally well known that moisture aids the decomposition of organic matter, the development of fungi, and structural decay.

In our next number we propose to treat of the various methods employed for, and materials used in, the exclusion of ground-air and prevention of damp.

It is stated that one of the builders contracting for the erection of the new infirmary at Cardiff wishes to withdraw his tender, a slight error in calculations of £9,000 having been discovered.

Messrs. Robert Boyle and Son have recently applied their system of ventilation and sanitation to the Brompton Oratory, South Kensington, and we understand that it has proved so highly successful, that the Rev. Fathers have presented Messrs. Boyle with a testimonial to that effect. The new extensions to the Devonshire Hospital, Buxton, opened recently by His Grace the Duke of Devonshire, are also fitted throughout with Messrs. Boyle's Air-pump Ventilators, which are likewise being applied for the ventilation of the Lambeth Infirmary.

ON THE TRANSMISSION OF DISEASE BY MILK.*

By FRANCIS VACHER,
Medical Officer of Health, Birkenhead.

THE fact that disease may be communicated by means of food is sufficiently well attested to remove all doubt on the subject from the minds of medical practitioners, yet it is only comparatively recently that this fact has been given a prominent place in etiology; and even now our knowledge as to what foods will transmit disease, and what diseases may be thus transmitted, is not as explicit as one could desire.

Having some special facilities for the study of comparative pathology, I have on more than one occasion striven to answer these questions so far as regards meat. I may refer you to my last paper, entitled, 'What Diseases are Communicable to Man from Diseased Animals used as Food?' which appears in the SANITARY RECORD for Oct. 15, 1881, p. 154. I have thought, therefore, that the most profitable way of occupying the time allotted me today would be by taking up the transmission of disease by milk. Certainly, of all foods capable of serving as carriers of disease from man to man, or from animals to man, meat and milk are the most capable. Indeed, if we take into consideration the tendency of milk, as served to the public, to become associated with another familiar fluid, it becomes probable that there is no food so liable to transmit disease as milk.

I shall consider, then, the various ways in which it is possible disease may be transmitted by milk.

1. It may be derived from a cow suffering from a specific epizootic disease.
2. It may be derived from a tuberculous cow.
3. It may be drawn from an inflamed udder.
4. It may have undergone chemical or fermentative change.
5. It may have become infected with the contagium of an animal disease.
6. It may have become infected with the contagium of a human disease.

The specific epizootic diseases of horned cattle ordinarily met with, or likely to occur, are cattle plague, pleuro-pneumonia, splenic fever (under which term it is convenient to group all anthracoid diseases), and foot-and-mouth disease.

The danger of milk being thus specifically infected is not nearly so great as might be inferred from the special susceptibility of cows yielding milk to the influence of contagion. This is due to the milk secretion being often almost entirely arrested at an early stage of the disease, or to its physical characters being so changed as to preclude it from being offered for sale in the public market.

In cattle plague one of the prominent symptoms is generally colliquative diarrhœa, and the milk is, as a rule, so diminished in quantity that it is difficult to get a sample of a few ounces for analysis, and when the sample is obtained, it is found to differ from ordinary milk far more than colostrum. The sugar is scarcely a quarter of the normal amount, but so much are the butter fats increased as to raise the total solids to above the average, in spite of the loss in sugar.

Almost the same may be said of splenic fever. The disease comes on rapidly, and one of the

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* Read at a Meeting of the Lancashire and Cheshire Branch of the British Medical Association at Bolton.

earliest symptoms is the arrest of the milk secretion. If there should be any yield, it is thick, has a bad colour, contains visible traces of blood, and readily decomposes. Still, there are cases on record in which the ingestion of milk from a cow suffering from this disease communicated the disease. Desplas gives instances of the disease being transmitted to animals in this way, and Chisholm cites the case of a girl of three years old, who presented all the symptoms of anthrax after drinking milk given by an affected cow.

Pleuro-pneumonia does not appear to interfere appreciably with the milk secretion, and here, and in foreign countries, when the epizootic has prevailed, the milk has been sold in the open market, and I know of no way by which it may be recognized. It is fortunate that there is no evidence of this disease ever having been communicated to man, either by the ingestion of infected milk or otherwise.

Foot-and-mouth disease nearly always exercises a marked influence on the milk supplied by the subject affected. The total yield is diminished, the butter fats are increased, and the fluid has a tendency to get stringy. It sometimes contains vibriones, pus corpuscles, or even blood. Sometimes it has a faint cheesy odour, and in any case it readily sours. The communication of the disease to man admits of no doubt, and, from the fact that sucking calves fed from affected animals get a very severe and fatal form of the malady, the ingestion of the raw milk appears to be one of the readiest ways of transmitting the disease. Various carefully planned experiments have been made with the view of determining whether the disease may be induced in animals by feeding them on milk from diseased cows; but these are little to the purpose. Children fed on such milk have developed vesicles on the mouth and fauces, and, in rare cases, on the interdigital spaces. One case is on record in which the toe-nails loosened.

The summing up of this portion of my subject is that there is no sufficient ground for believing that cattle plague or pleuro-pneumonia can be communicated to man by ingested milk, and that cattle plague milk is probably never offered for sale. Anthracic disease and foot-and-mouth disease, on the other hand, may be communicated by milk; but in neither case does the secretion yielded by the diseased animal present the characteristics of sound milk, and the yield of milk by a cow attacked with anthrax is so diminished and altered, that it is rarely, if ever, used for human food.

The question whether milk derived from a tuberculous cow can be used for human food with impunity, has been recently much debated. Rather more than two years ago, Dr. Creighton of Cambridge contributed a paper to the *Lancet* on 'Bovine Tuberculosis in Man', and shortly afterwards he issued a monograph on the subject (see SANITARY RECORD July 15 and Oct. 15, 1881, pages 29 and 152). Certain cases of acute tuberculosis in the human subject coming under his notice, he observed the morbid appearances presented a more or less close resemblance to those characteristic of bovine tuberculosis; and from this he concluded that such disease in man is probably produced by direct infection. However, no such direct infection was traced in any one case; so that, although Dr. Creighton has drawn increased attention to this subject, he has really very little advanced the question whether tubercle can be communicated from animals to man. I have, myself, elsewhere endeavoured to show that though pearl disease is analogous to human tuberculosis, inasmuch as the microscopic characters distinguishing true tubercle are present in pearls, there are many striking points of difference between the two diseases, not the least important of which is the difference in the exact site of the tubercular matter deposited. The sum of our knowledge as regards the infectiousness of tuberculous milk appears to be that it can, by being used as food, induce tuberculosis in many animals, as is proved by the experiments of Klebs, Gerlach, and Orth. Besides this there are a few isolated cases in which children have developed the disease after having been fed on milk from affected cows; *e.g.*, Fleming, in a recent tract on tuberculosis, says: 'Dr. Stang, of Amborach, has given an instance of a child five years old, who had been allowed to consume, for a somewhat long period, the uncooked milk of a tuberculous cow, and who died from tuberculosis.' And he cites, in the same tract, another instance communicated to him: A surgeon in Providence, U.S., had a cow affected with tuberculosis, the milk of which was consumed by his family, a large portion being allowed to one of his children. The veterinary surgeon called in to attend the animal warned the owner as to the danger of giving this cow's milk as food, but the warning was unheeded. The latest intelligence is that the child which received the largest share had died of tubercular meningitis.'

There does thus appear sufficient evidence in favour of the transmission of bovine tuberculosis by means of milk to the human subject, to warrant us in pronouncing it unfit for human food, and endeavouring to exclude it from the market if possible. As regards the quality of such milk, it is, probably, always somewhat deteriorated; but I know of no means by which its identification is possible, even by an expert.

When milk is drawn from an inflamed udder it is usually said to be gargety. Garget is a very common term among cattle salesman and farmers. For example, when a pig suffers from repletion, it is said to have garget of the maw; and in some parts of the country garget is used to signify a disease of the throat. Ordinarily, however, the word implies inflammation of the udder, acute or chronic. Cows allowed to get into too high a condition through being turned into a very rich pasturage, or otherwise, are predisposed to this. The exciting causes are various. The most common are cold and exposure, overdistention of the udder from being long unmilked, bruising from unskilful milking, leaving a residuum in the udder, pressure from an awkward way of lying. When from one or more of these causes mammitis is once set up, it too often goes on to suppuration, the formation of abscesses and sloughing. Taken in an early stage of the disease the most important indication is to milk the udder quite empty twice a day; but, owing to the painfulness of the operation and the difficulty of getting the milk to flow, this can seldom be done. It is, however, always attempted, so that a cow with garget is regularly milked. Being ropy and often quite curdled, and frequently containing pus, bloody serum, and other effete matters, it would not meet with a ready sale if kept by itself; but mixed with the rest of the produce of a dairy (perhaps twenty times its volume of sound milk) it readily passes muster. It should be borne in mind that this form of unwholesome milk is specially liable to be mixed with good milk. Epizootic disease, being for the most part readily communicated, may affect the whole stock of

a farm at the same time; similarly, ill-ventilated town cowsheds, in which animals are fed and stalled under the usual insanitary conditions, commonly have several inmates suffering from phthisis at one and the same time; but cases of garget occur singly and have no tendency to spread beyond the case first affected. There is, therefore, usually plenty of of good milk to mix with the tainted, and it is ordinarily mixed. Again, garget being due to causes always obtaining, and wholly unaffected by enzootic or epizootic influences, milk is probably very frequently tainted from this cause. Indeed, it is so sometimes, quite inadvertently, the fact that a cow has garget, being sometimes not noticed till after two or three milkings. Now as to the unwholesomeness of gargety milk. I do not think this admits of doubt. It is always changed, and beside containing pus and dead blood, may suspend portions of broken down tissue. I do not suppose gargety milk is ever sold unmixed. I have never seen any except what was specially sent for examination. Even mixed there is evidence of its producing indigestion and diarrhœa, and what may be defined as mild toxic symptoms. This seems to be the extent of the mischief it can accomplish. It has no power to set up any disease allied to garget, such as erysipelas or tonsillitis, so far as I have been able to ascertain.

Milk which has undergone chemical or fermentative changes serves as a culture medium for certain low forms of life, which without such change it could not support; and these low forms of life appear to be capable of setting up a not very severe form of pharyngitis, which under one or other name has been often observed, and on several occasions referred to the agency of milk used as food. I do not think this is surprising, as fermentation itself is but the result of the presence and multiplication of a low organism, and we know how readily bacteria form in the whey of curdled milk. Milk is exposed to the influence of the miscellaneous goods in a chandler's shop, to the influence of stale fruit and greengroceries, or in the bad air of a crowded ill-ventilated living room. In one or other of these ways, or in all of them, milk is tainted, and people partaking of it get sore throats. This, I believe, is a not uncommon experience. On examination of the whey, small round or staff-shaped bodies are found, but nothing special or that you would not find in a stale vegetable infusion of the simplest kind. Disease seems thus to be occasionally conveyed to the drinkers of milk, which was originally wholesome, and which appears to have undergone no change beyond that to which all milk is liable. I say occasionally, because milk is exposed to the same influences and undergoes changes presumably the same, as an every-day occurrence, without producing any effect on those using it as food. I cannot attempt to explain this phenomenon, but I am sure that many health-officers will bear me out that cases of sore throat occur as I have stated.

Milk may become infected with the contagium of an animal disease in many ways. It will suffice to give three examples. In small dairies where only a few cows are kept, and the horse for the delivery cart is stabled in the cowhouse (not an uncommon arrangement) milk may become contaminated with the contagium of glanders, a disease which is undoubtedly communicable to man, and by means of the nasal discharges which are given off so abundantly by affected animals. Where the dairyman and his employés are not as scrupulously clean and careful as they ought to be, milk may be fouled by portions of alvine discharge; and if the cow should chance to have rinderpest or some disease the specific contagium of which is contained in the discharge, the milk would assuredly be specifically tainted. There is no reason to believe that rinderpest could be communicated to the human subject; still the bare idea is nauseating, and the fact that such fouling of milk does take place now and then is certain, as I once found positive evidence of it in a sample of milk submitted to me for examination. Again, milk may become infected with a specific contagium, when the contagium is contained in vesicles on the udder and teats, as in foot-and-mouth disease. In such a case some of the vesicles are sure to get ruptured in milking, part of the contents being mixed with the infected animal's own milk; and if the milker without washing his hands proceed to milk an unaffected cow, the contagium will be mixed with her milk also.

That milk may become infected with the contagium of human disease is unhappily but too well known. Again and again is the story told in the medical journals of how diphtheria and scarlet fever are delivered in the morning milk can; again and again do we read of pails, rinsed out with water from a polluted source, being used by a dairyman whose customers one after another, have sickened with typhoid fever. The dairyman's family is suffering from infectious disease, or one of his employés, or the farmer from whom he buys, and a few contagium particles rest in the milk and the fatal disease is soon spread over a large district. Doubtless, often in the past it has been done in ignorance, but at present it is not often that the plea of ignorance can be maintained. In all future investigations it should be possible to bring criminal negligence home to some one person at least—farmer, retailer, or employé.

How many other human diseases, beside these three familiar ones, may be carried by milk is as yet uncertain. It is exceedingly probable that measles may sometimes be conveyed thus, and almost certain that one way in which diarrhœa spreads is by means of the cheap adulterated milk supplied to the poor.

I am conscious that I have treated this topic in a superficial way only, but that was inevitable considering the limited time at my disposal. A single subdivision of it, such as the evidence for and against the communicability of tubercle by means of milk from phthisical cattle, could scarcely be adequately reviewed in a paper of ordinary length. However, I have borne in mind that I was addressing myself, for the most part, to those who have little leisure to study public health subjects, and I am content if I have made a little clearer to anyone, what, in the main, are the risks run from infected milk.

The sum of the matter is, that whenever disease is transmitted by milk, it is, with few exceptions, owing to the dishonesty or uncleanliness of milk sellers. Blame is also due to the public for being satisfied with a form of delivery which must occasionally result in milk becoming infected—I allude to the practice of milksellers leaving their own cans at houses. In the early morning, because the cook is not up, and in the afternoon, because the milkman is in a hurry, milk cans are left at houses, and called for some hours later. If in any of such houses there be cases of scarlatina or diphtheria, what a risk has been run! Such cans are commonly given back without being washed, and they may be used again on the same round.

In conclusion, I have only to add that the two

precautions that the householder, who would protect himself from infection from this source, should take, are :—

(1) To examine the milk delivered to him, and to reject it if it comes in an obviously dirty vessel, if it appears to be watered, or if it is streaky, ropy, blood-stained, or from any cause looks or smells bad.

(2) To insist upon all the milk received being thoroughly boiled.

THE MEDICAL PROFESSION IN LIVERPOOL, AND THE NOTIFICATION OF INFECTIOUS DISEASES.

By F. W. LOWNDES.

THE members of the profession in Liverpool and its neighbourhood had recently an unusually favourable opportunity of discussing the subjects of isolation hospitals and the notification of infectious diseases. The Health Committee of the city, with a courtesy which cannot be too highly commended, forwarded through the Town Clerk a copy of the suggested amendments of the Building and Sanitary Acts to the President of the Medical Institution, Mr. Reginald Harrison. Together with these was a request that these amendments should be considered by the members, and that the result should be forwarded to the Health Committee.

This was read at the ordinary meeting of the institution on the 20th of October last, when it was resolved that the next ordinary meeting, to be held 3rd November, should be devoted to a discussion of these amendments in so far as they affect medical practitioners. In addition to the usual notice of the coming meeting, each member was furnished with a copy of the amendments (as a privileged communication), and was thus enabled to consider them fully in all their bearings before discussing them. It may be as well to give them here *in extenso*, as they may differ in some important respects from those adopted elsewhere.

That the Liverpool Sanitary Acts be amended by the insertion of the following clauses :—

For better protecting the public health of the inhabitants of the City, and better preventing the spread of infectious disease, the following enactments shall take effect (that is to say):—

The Corporation from time to time may by order, under the hand of the Town Clerk, direct any public or private day schools in the City, situated in any neighbourhood, threatened with or affected by infectious disease, to be temporarily closed or suspended. The period of such closing or suspension shall be stated on such order.

The Corporation may by like order direct any dairy, shop, or other place used for the sale or storage of milk or provisions to be temporarily closed, whenever, from the appearance of infectious disease in such dairy or other place, or in rooms in connection therewith, such action appears to the Corporation to be necessary. The period of such closing shall be stated in such order.

In order to secure that due notice be given to the Corporation of any inmate of any building used for human habitation in the City who is suffering from small-pox, cholera, typhus, typhoid, scarlet fever, relapsing fever, puerperal fever, scarlatina, or diphtheria, the following provisions shall have effect (that is to say) :—

(1) If any such inmate be suffering from any such disease as aforesaid, the occupier or person having the management or control of such building, or if such occupier or person is prevented by reason of such disease, the person in charge of such inmate shall, so soon as he shall become aware of the existence in any such inmate of any such disease, forthwith give notice to the Medical Officer of Health, Municipal Offices, Dale Street, of the existence in such inmate of such disease :

(2) If such inmate be not a member of the family of such occupier or person, the head of the family (resident in such building) to which such inmate belongs, or if there be no such head, or such head be incapacitated by illness, then such inmate (unless prevented by reason of such disease or of youth) or the person in charge of such inmate shall, on becoming aware of the existence in such inmate, or in his own person as the case may be, of such disease forthwith give notice thereof to such occupier or person :

(3) The Corporation shall on request provide and supply gratuitously to every registered medical practitioner resident or practising in the Borough forms for the certificate by such medical practitioner of the particulars hereinafter mentioned in relation to such cases.

(4) Every medical practitioner attending on or called in to visit such inmate shall, on becoming aware that such inmate is suffering from any such disease as aforesaid, forthwith fill up and sign and deliver to the occupier or person having the management or control of the building, or in case such person is suffering from such disease to the person in charge of such inmate, a certificate stating the name of such inmate, the situation of such building, and the name of such occupier or person, and the nature of the disease from which such inmate is suffering :

(5) The person to whom such certificate shall be given by the medical practitioner shall forthwith deliver the same, or cause the same to be delivered, to the Medical Officer of Health, Municipal Offices, Dale Street :

(6) The Corporation shall pay to every medical practitioner who shall, in pursuance of the Section, duly give any such certificate as aforesaid, a fee of two shillings and sixpence in respect of the same.

Provided that more than one fee shall not be paid under this Section, within an interval of thirty days, to the same medical practitioner for certificates given by him in respect of the same disease occurring in the same building :

(7) The Council may, from time to time, by resolution, order that, subject to the approval of the Local Government Board, any acute infectious disease, other than those above-mentioned, shall be deemed to be within and subject to the provisions of this Section :

(8) When the Local Government Board have approved of any such order, the Council shall cause a copy thereof to be published by advertisement in one or more local newspapers circulating in the district, and after such public notice has been given, the provisions of this Section shall, so long as the order continues in force, apply to the acute infectious diseases specified therein, in like manner in all respects as if the diseases were mentioned in this Section :

(9) Any medical practitioner or occupier neglecting or refusing to comply with the foregoing provisions shall be liable to a penalty of not exceeding £——.

Upwards of eighty members attended the meeting, and an interesting discussion took place. The amendments met with almost unanimous condemnation, and eventually a sub-committee was appointed to draw up resolutions embodying the opinions of the members, which were communicated to the Health Committee in the following letter:

Letter from Mr. Reginald Harrison, President Liverpool Medical Institution :

To the Town Clerk of Liverpool,

After a prolonged and careful consideration by the members of the Medical Institution, at a meeting especially convened for the purpose, of the clauses proposed to be in an amended Building and Sanitary Act for the City, they regret that they feel themselves unable to recommend their adoption for the following reasons, viz.:—

1. They are of opinion that the risk of propagation of disease by means of dairies or milkhouses is greatly lessened by the Dairies, Cowsheds, and Milkshop Orders of 1879, and that a much longer trial should be given to these orders before new powers are asked for.

2. They are of opinion that the danger of introducing

infectious diseases into schools would be effectually met by requiring each child to bring medical certificates of freedom from such diseases after holidays or other absence from school, and would suggest a trial of this course, instead of adopting the more stringent plan of compulsory closure.

3. They are of opinion that the householders, fearing the effects of publicity under a compulsory system of registration, may be tempted to conceal the existence of infectious disease, and that during such period of concealment, the danger of multiplication will be greater than at present, when under the skilled guidance of medical men, more or less effectual means are taken to effect isolation.

4. They are of opinion that the experience collected from other towns (so far as members have been able to obtain it up to date) tends to prove that the anticipated advantages to the public health have not followed the adoption of similar clauses, and that serious inconveniences to the community have resulted therefrom.

Subsequently, at the request of the Health Committee, a deputation from the Medical Institution, consisting of the President, Drs. Turnbull, Waters, Carter, Davidson, Caton, Mr. Paul, and Mr. Edgar Browne, waited upon the former at their weekly meeting, and through Dr. Carter expressed their views more fully. After an adjournment and considerable discussion, it was decided to postpone any further action for the present.

The Medical Officer of Health for Liverpool (Dr. J. Stopford Taylor), who is strongly in favour of these amendments, has replied to the objections urged in the above letter, and it is only just to him to notice these. He points out that the Clause in the Dairies, Cowsheds, and Milkshops Orders, making it unlawful 'for any person suffering from a contagious disease, or having been recently in contact with a person so suffering, to take part in the business', cannot be enforced unless the Medical Officer of Health is informed that infectious disease exists at the house. He quotes as an illustration, a case where the first intimation he had of the presence of typhoid fever at a milk house was from the registrar that the keeper was dead. On visiting the house, a boy was found suffering from fever, and the milk business was being carried on without any precautions. The sufferers were attended by a medical practitioner, and the disease was spread round the neighbourhood. Dr. Taylor gives another case, where the registrar notified a death from fever at a milk house, the trade having been carried on as usual; and adds that many similar cases might be given. He also points out the dangers arising from children living in infected houses attending school, and argues that, if the amendments were adopted the fear of concealment would be groundless, as a severe penalty when discovered would make this concealment more difficult. The following extract of a letter addressed to him by a local practitioner is interesting, as showing the views many take as regards this question.

I would personally wish to give information to the Medical Officer of Health, but I feel I should not do so without the permission of my patient. At the present moment I could like to inform you of a case of confluent small-pox in a girl seven years old (vaccinated), where there is a baby six weeks of age, not vaccinated, and where there are some ten or twelve, between adults and children, dwelling in the same house who have not been re-vaccinated. I have urged vaccinating the family and the servants for the past ten days, and not one—not even the baby—has been submitted to this simple prophylactic operation. What am I to do? To betray the confidence of my patient and report to you? No. Professional confidence is too sacred to be betrayed even for the public good; I must wait until death betrays them.

The following is the method of procedure when the powers are obtained as detailed by Dr. Taylor. 'On receiving notice that disease existed, inquiry would be made if the patient was isolated so as not to affect the public; if the sanitary arrangements of the house were satisfactory; and if children were going from the house to school. Should the patient be isolated, he would be left in the care of his friends until convalescent, when the doctor would be expected to state the time for disinfecting and cleansing the house. In most cases, even if the sanitary arrangements are perfect, the drains would be flushed, and notice would be sent to the school at which the children attended. Should the patient not be properly isolated, as in a lodging house, sub-let house, and in many places of business, advantage would be taken of the provisions of the Public Health Act, and the patient removed to hospital.'

The great objection urged by the Liverpool medical practitioners is the compulsory clause, imposing the necessity of reporting under a penalty. It is not intended that nothing should be done; on the contrary, we are informed, that the subject is still under discussion, and it is hoped that before long a practicable and less objectionable measure may be framed. It must be remembered that the case is one on which we cannot generalise, and a mode of dealing which, in one case, would be alike humane and wise, would, in another, be harsh and foolish. The difficulties of the practitioner in the case of small-pox, detailed above by Dr. Taylor, might have been removed by a second opinion, or a little more firmness on the part of the medical attendant. In the case of a patient suffering from fever in a large house, where isolation can be perfectly effected, and every sanitary means adopted; where physicians are in attendance with skilled day and night nurses, and where every one in the house is well aware of the necessity for disinfection of all articles used by the patient; in such a case, the interference of the Medical Officer of Health in any shape or form would be regarded by many as an impertinent intrusion. The experience of the last ten years shows how much has been done to mitigate the dangers of epidemics. During the epidemics of small-pox and relapsing fever which raged in Liverpool in 1871, the living and dead were in the same room for days together; patients with small-pox lay on the bare boards which constituted the floors of their rooms; houses were crowded from attic to basement with fever patients who lay in heaps on the floor, and there was no remedy. All this has changed. Dead bodies can be removed, and fever patients, without proper lodging, can be sent to hospital on a magistrate's order. Dr. Taylor has shown that deaths from fever are soon known to him, and this fact, with the possession of the powers just alluded to, will most probably prevent any future epidemics from assuming the formidable proportions of those in former years. The subject is one which may properly be discussed, before more arbitrary powers are sought, or invidious duties imposed under penalty upon members of the medical profession, and it is to be wished that all other members of the profession, especially those engaged in sanitary work, will assist their Liverpool brethren in devising some scheme which shall embrace all sanitary requirements without including any impracticable or objectionable features.

THE SINS OF THE PLUMBER.

By W. K. BURTON,
Resident Engineer to the London Sanitary Protection Association.

I.

IN writing on the sins of the Plumber, I would have it understood that I by no means wish to condemn plumbers as a class. I believe that on the whole the plumber is by no means as black as he is painted. There are many careful, skilful, and conscientious men amongst them: nay, I will go so far as to say that the majority are so. This statement applies particularly to plumbers proper—the men who are 'plumbers by trade'. Strictly speaking, it is only the man who works in lead who goes by the name of plumber; but in the mind of the ordinary householder all the workmen who take any part in fitting up the drainage arrangements of a house are classed under the name as a generic title, and it is in this general sense that I use the word in the heading.

I say that the plumber proper is often a conscientious worker. There is nothing more common than to find the lead work in a house excellently done, while the drainage is most imperfect. The reverse is very rare.

In estimating the merits of the plumber, it is quite necessary to take into consideration the peculiar conditions under which he works. In fixing the sanitary work in a house, he has generally to make his work fit into that of others who have worked before. Little or no consideration has been given to him in the designing of the structure, and he has to do the best he can in fitting his pipes, etc., into inconvenient corners. His work is almost immediately after it is finished covered up, and it is ten to one that he will hear no more of it. He will get as much thanks if it is badly done as if it is well done. In fact, no work is so thankless as good plumber's work. It makes little show, and to the eye of the uninitiated there is little difference between good work and bad. Should the latter be discovered, the abuse is certainly loud enough—as I have said, the probability is that it will not be discovered—but for the former there is little praise.

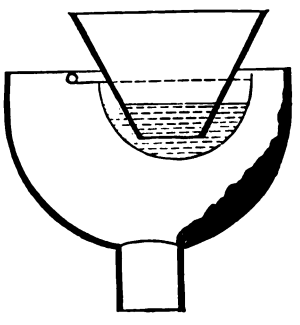
That the character of the work put in will in all probability not be discovered is of course only a poor excuse for its being bad; yet it is only in human nature that the fact should lead to occasional scamping. Which of us could say that, were he in all probability to get equal credit for good or bad work, he would always execute the former?

'Ah! but,' says the reader, 'proper supervision of the work whilst it is being executed ought to prevent the possibility of bad work being put in.' So, doubtless, it should; and so it does when the work is on a sufficiently large scale to justify the expense involved in the supervision required, and when a thorough supervisor can be found. But very often this is not so. Take the very common case where the work is so small in extent that it is impossible to put more than one 'plumber and his mate' on to it. Would not the householder who would have to pay for the supervision of these men be the first to cry out against the amount which it would cost him? To thoroughly supervise a couple of plumbers costs almost as much as to do the same for forty or fifty.

Having thus stated my opinion that the plumber is not so black as he is painted, and having apologised for the faults which he undoubtedly does commit, it is necessary to look at the other side of the question. Take the plumber who does scamp his work; grant that he is the exception. I have said that the probability is that his scamping is never discovered, or is not discovered until such a period has elapsed that it cannot be traced to the individual perpetrator. Yet frequently it is discovered; and then, how? How is it found that the drains under the house have been imperfectly jointed, that seamed soil-pipes have been fixed with a seam which has never been gas-tight, or that putty has been used in place of solder? Probably by the occurrence of disease or death in the house. What a grave responsibility is here involved. How different the fault from, say, the scamping of work on the roof of a house, which will lead to a leakage of water and the destruction of a little property. It is on account of this that the plumber is justly condemned. Not that he is a less careful workman than others; but that the results of his carelessness may be, and often are, so terrible.

So far I have been considering only the workman, the actual executor of the work. But it is necessary to inquire also into the work of his superior, the master-plumber; and he is, I believe, more often to blame than his men. The workman does not as a rule scheme out the general design of the work, nor select the appliances which are to be used. This his master usually does; and with a few bright and notable exceptions, the master-plumber seems to envelop himself in a mass of stupidity so dense, that it prevents him from taking the smallest notice of the enormous advance which has been made in sanitary science during the last twenty or thirty years. It is difficult to see how he can so completely keep out the light; how he can remain so entirely oblivious of facts which are becoming so generally known that a knowledge of them is not confined to specialists, but is spreading amongst the general public—amongst every section of it, except, apparently, that in which the master-plumber is to be found. The latter fixes a certain appliance, one which has been condemned by every man who has given real thought to the subject; and why? His father fitted the same before him! As a rule, of a number of modifications of the same appliance he will select the very worst. I shall take a few examples.

First there is the water-closet. The variety of patterns and designs which are offered to the purchaser is enormous; but amongst all these there is one which stands out as the worst; one which has been unreservedly condemned by every sanitary authority since sanitary science had an existence; one which

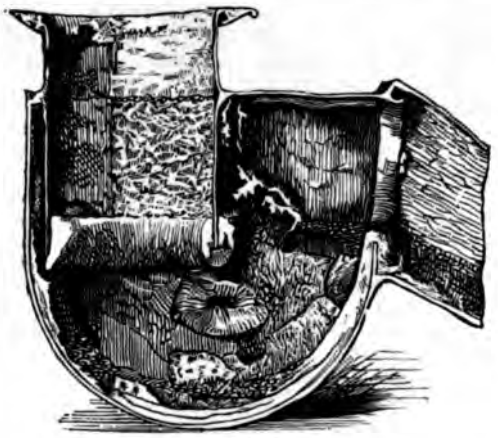


Pan Closet.

consists mainly of what is little other than a cesspool; an appliance which is the cause, in three cases out of four, of the 'smells' complained of in houses—the pan closet. This has been chosen by

the plumber as his favourite; as the one which he will fix when he has any option in the matter!

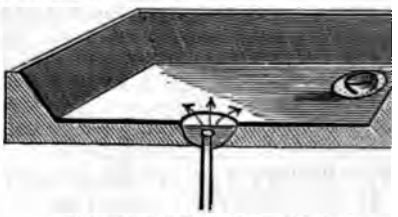
Now we shall pass on to the case of the trap which is to go below the closet. Here the forms to select from are not quite so great in number. Still, there is a goodly array of traps, having various merits; and, as in the last case, there is one which stands out conspicuous—not by its excellence, but from the fact that it has been condemned by every sanitary authority. I mean the D-trap. This has been selected by the plumber as the trap which he will fix under his pan-closet. He is at least consistent here. He will not put new wine into old bottles. He will not fix an efficient trap under an inefficient closet. The accompanying sketch, which shows the usual condition of the D-trap after it has been in use for some time, is from Mr. Hillyer's excellent book on plumbing.



D-Trap.

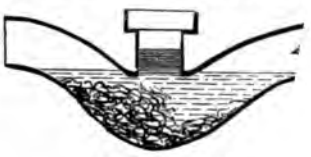
There is, in the case of the D-trap, a reason for its use, however insufficient it may seem. A master-plumber who employs a good number of hands frequently has great difficulty in keeping them employed. His work fluctuates considerably. At one time there is more than his men can do; at another he must find some work for them in the shop or else dismiss them. Now, the making of D-traps is the very thing: it is the sort of 'fancy job' that the plumber likes. It would not pay him to make any of the simpler and better kinds of traps, such as the syphon, because they can be bought so cheaply. It is no matter to him that he is charging his customer an extra price for an inferior article: his customer is generally too ignorant to have an opinion on the subject.

I will take another example—the sink-trap. It may be taken as almost a matter of course that the plumber will arrange his sink to discharge into the drain, not into the open air over a trapped gully as he should do. This being the case, it is necessary that he should provide some security against a *constant* emission of sewer gas from the discharge-pipe into the house. He must fix a trap. Here, again, he has an enormous choice; the number of traps designed for the purpose under consideration is almost indefinite. But there is one which stands out from amongst the lot as affording a smaller security than any other, which has so small a 'seal', that the evaporation of an eighth of an inch of water will often do away with it altogether; which is so constructed that the servant who is using the sink [illegible] moment remove the part which affords even this small seal—and constantly does—w blast of sewer gas, of such strength that tinguish a candle, blows into her fac scarcely say that I refer to the bell-tra elect of the plumber.



Sink with Bell-Trap, the Bell being remo

I shall take one more case, that of the trap for main drains. Few appliances more attention paid to them than this on Buchan introduced his excellent trap, the secured ventilation to the drain, and which fixed, would clear itself. Numerous trap brought before the public, all of which, nearly approach his in efficiency and simp plumber has his choice of all these, but he oblivious of their very existence. Ther which suits him better; a trap which po faults of all or any of the others, and n advantages. This, of course, he mus mean the so-called 'syphon-trap'. It mu stood that the term, as applied to a main signifies an entirely different appliance f does when applied to a trap on a lead main drain syphon-trap is so construct sewage is carried into it in a sluggish that any heavy material which may be c with it is not carried through and out but is left at the bottom of it, where an is soon formed. Then the trap gen cleaning eye. This is so situated tha useless for ventilation. It is also so sit material lighter than water, especially



Drain Syphon Trap.

up into it. The probability is tha combined effect of the top and bot will be to choke the trap entirely u things will take place. If, as is p is defectively jointed, all the sewag escape into the soil under the base accumulate probably for years, th reputation for being 'unhealthy', will break out, and the whole t gated. If the drain is watertigh in it till it overflows at some will be taken to find the positio be it noted, the man who will f trap is not the sort of man wh of building an access manhole great deal of excavation will probably the affair will en determining not to have any gas thereby encountered ap evil than the other of the choked.

; in system might be classed with those selection which I have enumerated, but the a very large one, and one which has been eated in this Journal from time to time. Editor's permission I shall give, in another a set of examples of actual specific faults in ion which have come under my notice, ıg, where necessary, with sketches.

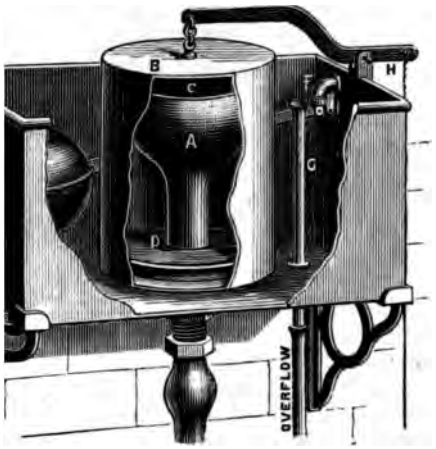
. SERIES OF REPORTS ON ARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

By our Special Commissioner.

XI.

TH WATER-WASTE PREVENTERS.

oceed to notice some of Messrs. Doulton's arrangements for the prevention of waste of the most important of which is their



No. 59.

acuum Waste Preventing Cistern, No. 59, ving of which is given above. The con- is very simple, the action thoroughly effi- l the price renders it applicable to all classes ty.

scharge is accomplished by the formation of , which is at once filled up by the water, whereupon the syphon is started; the method of attaining this end is as follows:—

An upright pipe, A, with trumpet-shaped outlet C, is fixed inside a two-gallon cistern; over this is placed a cylinder B, with space around at D, to allow the water in the cistern to pass up through. By drawing down the lever H, the cylinder B is raised, and its diameter being greatly in excess of the outlet of the discharge pipe, a partial vacuum is formed which is immediately followed by the water, the latter falling down the trumpet-mouth C, and starting the syphon. The two gallons are then discharged, the velocity being greatest at the finish, a most important advantage in flushing closets.

This form was specially designed for use with the Lambeth Flush-out Closet, No. 14, but it is adapted for any kind of common closet.

For valve-closets a special cistern is provided with an aftercharge, and it is so constructed that on releasing the handle the syphon action is arrested although the whole contents may not have been discharged.

No. 90.

The vacuum principle is applicable to many arrangements, and among others, a seat action for closets, No. 91, and a treadle action for the urinals, No. 90. In each case no water can be discharged until the user *leaves* the apparatus.

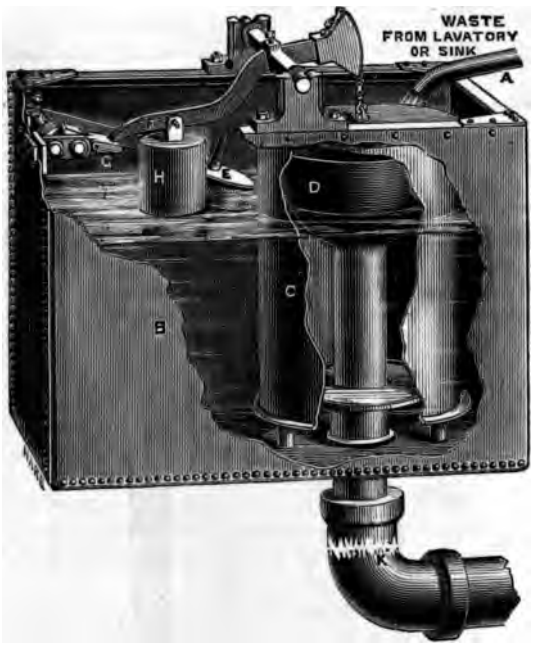
The Lambeth Patent Automatic Flush Tank is another application of the vacuum principle. It is designed for flushing-out drains, and is mostly fixed so as to intercept rain-water, wastes from sinks, lavatories, baths, etc. By this means, small quantities of water which of themselves would be ineffectual, are stored up and discharged in volume when the tank is full.

The description of the accompanying illustration is as follows:—

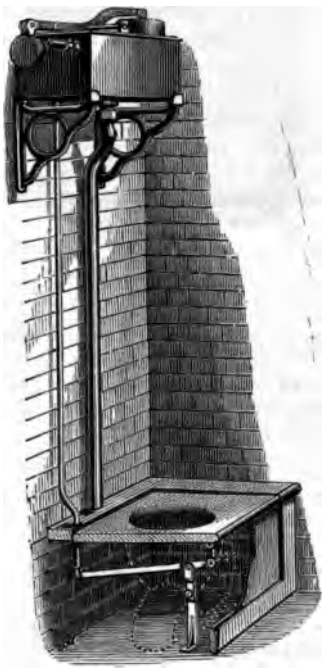
A represents an inlet to tank B. As the level of the water in the tank is raised, so the float E rises, and this gradually depresses the releaser G, which, in its turn, allows the lever T to pass; this is then acted upon by the weight H, and the cylinder C is raised, forming a vacuum, and discharging down the outlet D, precisely as in the ordinary Waste Preventor; but as the water is rushing down the pipes, the suction draws down the cylinder, causing the lever F to pass the hinged disengager C, and re-adjust itself for a second action.

The power of the discharge may be judged from an experiment, when a 100-gallon tank with 4-inch outlet was emptied in eighteen seconds. The tanks are made of various capacities and with different sized outlets, so that they may be utilised for numerous purposes, not the least being that of periodically flushing ranges of urinals.

For very large sizes, a simple skeleton is supplied to build into brickwork.



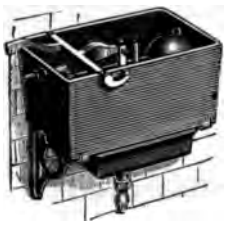
No. 46 and 55 are other forms of Waste Preventer cisterns of this firm for flushing closets and urinals, the latter being known as the 'Double Valve Cistern'. The illustrations explain themselves.



No. 91.

To meet a requirement much felt by some architects and others, Messrs. Doulton have also brought out a Waste-Preventing Valve to fix under the seat. It is constructed as follows :—

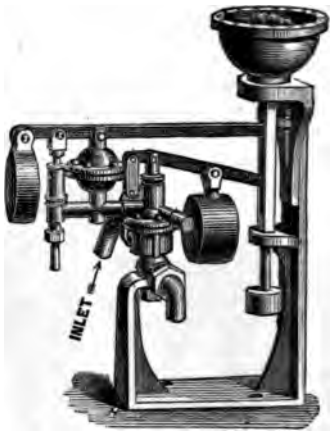
To their ordinary closet-valve (a description of which we gave in a previous article) is attached a small chamber, and when the valve itself is opened, the outlet to this chamber is closed, so that which in the ordinary valve keeps passing over the piston a the discharge, is collected, and gradually fills up the chamb



No. 46.

No. 55.

pressure thus accumulated orces down the valve to its seat the flow of water. The time taken between opening and clo be regulated from one to two gallons. On dropping the h



No. 15.

relief valve closes, retaining sufficient water to keep the valve and simultaneously the outlet of chamber is opened, by which superfluous water is discharged, and the valve is ready for a n operation.

ANIMAL LIFE IN WATER-PIPES.—The *Berliner Ta blatt* contains a somewhat graphic description of the sp mens of animal life to be found in the waterpipes of German capital. The filtering arrangements would se to be in some cases defective, as there are, occasional small eels found in the water-pipes, which are often cause of stoppage of the supply of water. In their you ful condition they are able even to get through a narr opening, and are to be found in the water when draw According to the details given, the same state of thi exists in Hamburg. Other varieties of living things are found occasionally in the water-pipes, particularly wor

SALICYLIC ACID AS AN ADULTERANT.—A Paris gr was recently brought up before the magistrate for se articles of food which had been treated by salicylic His goods were confiscated, and he was condemned t costs and a nominal fine of one franc. It will be re bered that a decree was issued last January by the M of Agriculture and Commerce forbidding any article or drink containing any quantity, though ever so infinite of salicylic acid or its compounds, to be offered fo The chemical inspectors were directed to ascertain t sence of this acid in the articles submitted to their ex tion, and to condemn those not free from it.

The Company of Mercers has voted ten guineas, Worshipful Company of Gunmakers five guineas, f Hilton's Crèche and Branches in Stepney Causewa

The inspector of manufactories at Berlin consid excessive smoke is caused by unskilful stoking Government have therefore resolved to establish i in which the art of making fires will be expla scientific principles.

THE
ITARY RECORD.
FEBRUARY 15, 1882.

will be glad to receive, with a view to ion, announcements of meetings, reports of ngs, and abstracts or originals of papers ore the members of any sanitary or kindred ion.

EVENTION OF SMALL-POX IN NOTTINGHAM.

e recent epidemic of small-pox in Lon- has, unhappily, not died out, but still and threatens to break out with more han before, the Sanitary Authorities in provincial towns were naturally anxious ease should be conveyed to and become n them. They therefore took precau- asures, and, considering the free com- that exists between London and the it speaks volumes for the careful nature easures that small-pox, as an epidemic, lmost wholly confined to the Metropolis; when the sanitary arrangements of the laced in the hands of a competent Central can it expect to be freed from recurring of small-pox.

cipal means of preventing the spread of s, of course, vaccination and revaccination. d adopted by the Health Committee of n to promote re-vaccination (primary vac- in the hands, not of the Sanitary Au- ut of the Guardians) are such as deserve y all Boards of Health, as well of the as of the rest of the kingdom. Not only mmittee arrange that at several stations the town re-vaccination should be per- all who desired it, free of charge, but they s to persuade people to avail themselves of tunity thus offered. A pamphlet was y the Medical Officer of Health, pointing cessity of, and the advantages accruing peration, and several thousand copies of of a large poster containing the same in- in an abridged form, were distributed over

In this pamphlet, the principal points are these:—1. That re-vaccination should ed on all persons after puberty; 2. That ion once properly and successfully per- es not require repetition; and 3. That the ce of re-vaccination should not be left to en small-pox is epidemic.

as these are, on the authority of the work on vaccination, we feel somewhat a offering any criticism. While, however, ndorsing the third recommendation, we p expressing our opinion that the first two statements, in the bare form in which they are put, lend themselves too readily to the specious arguments of anti-vaccinationists. The recommendation as to the age at which vaccination should be performed seems to us too indefinite to be of full practical value. The age of puberty is not a sharply-defined line of demarcation between childhood, and womanhood or manhood; it is rather a transition period, in which change takes place gradually. Its time of occurrence, moreover, varies considerably in different individuals, and if, as is advised in the poster, the operation be not performed till between the ages of 15 and 18, a very large number of persons will remain for several years in a condition susceptible to the contagion. It would be best, we should think, to recommend re-vaccination before the earliest age at which this process of transition has, as a rule, fully set in, and as it is ever wisest to err on the safe side, we may consider 10 as the most suitable age for the performance of the operation. This would apply, it is necessary to add, to those cases only where the primary vaccination is tolerably good; if the primary vaccination be bad, the sooner re-vaccination takes place the better.

The second statement in Dr. Seaton's pamphlet is put, we think, in much too absolute a form. The recent epidemic, at least, has shown that small-pox does occur in a small proportion of persons who have previously been successfully re-vaccinated, and if we take into account the comparatively small number of persons so protected among the classes most exposed to the contagion of small-pox, the proportion will, perhaps, be found larger than is generally thought. The fact that small-pox has almost never occurred among the re-vaccinated nurses and servants of small-pox hospitals, proves only that the operation is protective for a number of years, but as these do not, as a rule, remain for more than a few years at the same hospitals, it does not prove that the protective influence lasts through life. Repeated re-vaccination may be, as Dr. Seaton says, trifling, but, in our present state of knowledge, it is a sort of trifling which should not lightly be condemned.

The almost complete absence of small-pox among the nurses and servants of small-pox hospitals is now not questioned, even by anti-vaccinationists, but the value of the fact, as evidence of the protective power of re-vaccination, is objected to by these latter. It is said that the greater proportion of the staffs have already suffered from small-pox, and, therefore, only very few cases can be expected to occur, as there are but few not protected by a previous attack. The fact, however, is, that in the metropolitan hospitals, at least, only a small proportion of the staff have previously had small-pox, and this objection, therefore, falls to the ground. Quite recently, another objection has been brought forward, which well exemplifies the sort of argument to which these people resort. Among fever attendants, it is said, there comes to exist a tolerance of the poison, so, among small-pox attendants, there

also exists a similar tolerance, and, therefore, we must expect among the latter only very few cases of small-pox. What are the facts, however? In the ten years, 1871 to 1880, during which time there was, in London, comparatively little typhus fever,—(which alone, in this country, it is possible to compare with small-pox in this connection),—there were, among the staffs of the fever hospitals at Liverpool Road, Homerton, and Stockwell, no less than 78 cases of typhus contracted by attendants in the discharge of their duty, and, of these, 21 died, while, in the first-mentioned hospital, from 1861 to 1870 (inclusive), 174 nurses and servants, and 12 medical officers, contracted this fever, of whom 36 of the former, and 2 of the latter, died. If, then, the attendants on typhus suffer so extensively, while the attendants on small-pox, *except they be unprotected by re-vaccination*, rarely suffer at all, the inference is surely very obvious.

Within certain limits, and with some slight qualifications, it is perfectly clear that re-vaccination is practically a complete protection against small-pox, but while impressing this on the minds of the public, in season and out of season, we ought never to lose sight of the fact that the words 'never' and 'always' are unknown in medicine.

SLAUGHTER-HOUSES.

IN Dr. Eulenberg's recent handbook on Public Health, Dr. Esser of Göttingen is the author of an article of some length on slaughter-houses and other closely related matters. We are not aware that this interesting subject receives so full a consideration in any of the ordinary manuals devoted to preventive medicine in the English language. Scattered about in English periodical literature sundry allusions to this important department may be found, especially in the SANITARY RECORD of the last few years. The evils arising from cow-sheds, slaughter-houses, and the like buildings or places, are, or may be, fertile sources of pollution of 'Air, Water, and Places', in the language of Hippocrates. Not only do nuisances arise from the odour exhaled from the skin, lungs, and excreta of the cattle and other living animals kept in these places, but also danger is apt to occur from the pollution of water which may, in divers ways, be brought into association with dangerous materials. Soakage of putrefying animal matter through badly-paved floors of cow-sheds, etc., is one of the means whereby, through an easily conceived route, our drinking water, as obtained from wells and streams, may become contaminated.

In order to obtain a thorough grasp of the exact relations that these sources of danger bear to us in our daily life, it is necessary to bear carefully in mind those media which are most commonly the vehicles of disease. These means of communication are air, water, and milk, and there are many modes in which these may become the instruments of our discomfort, if not of our destruction. Besides ourselves directly, we have to consider the health of the cattle and other mammals.

That the necessary evils of cow-sheds and other like places may be reduced to a minimum, many considerations have to be taken into account. These are the situation of such places in regard to dwelling-houses, and certain important points in the construction of the 'abattoirs'. Sufficient space for each animal; a well-appointed ventilation; a thoroughly good impervious material for covering the lower parts of the walls and flooring; perfect drainage; free and frequent cleansing with abundant water; and plenty of whitewashing, are not to be regarded as details, but as absolutely necessary essentials. Nor is a very profound knowledge of such matters required in order to understand the why and wherefore of such things. The objectionable and suggestive noises given forth from slaughter-houses are by no means agreeable to most people. The odour emanating from bloody fluids and other animal matters found in 'abattoirs', where such material may be spattered about in every direction on the walls and floors, then undergoing decomposition and putrefaction, may prove a serious nuisance and danger, not only by contaminating the meat, but also by acting as a nidus of infection to the surrounding neighbourhood.

The materials suggested and used for the impervious flooring have been of various sorts, such as asphalt, cement, and concrete, and, in some places, the Staffordshire bricks, iron, and glass. Asphalt does not in many places, owing to its consistence varying with the temperature, readily lend itself for such purposes. Ballard strongly recommends concrete, and we think this is, perhaps, on the whole most satisfactory. Flag-stones well laid down are also very good. A point on which Dr. Esser treats is the depth of the graves used for the burial of dead animals, more especially of those dead from or with infectious diseases. The nature of the soil in which such graves are made, and their relation to the soil water, are features of special import, as it is obvious that dangerous contamination may arise from infection of the water ever circulating in the interstices and lacunæ of the soil.

The contamination of milk is such a serious matter, as bearing on the extension of 'foot-and-mouth disease' to cattle and man, that ample precautions should be taken to prevent any such misfortune. The 'Dairies, Cow-sheds, and Milkshops Orders of 1879' incorporate a very excellent series of regulations dealing with this element. It is a pity that the management of sanitary matters should be so arranged as it is in connection with cow-sheds, etc.; such division of practically similar labour only tends to make room for the creeping in of mishaps and faults, often fraught with disastrous results. If we could be sure of the carrying out of such rules as the non-mixture of milk from a diseased cow with

lk, and the non-sale of such milk for human for animals, unless previously boiled, then times, and much saving of money, would We assume for the nonce that the germs 'eczema epizootica' are not gifted with such es of indestructibility as has been asserted e disease-germs; were we not to do so, water would hardly seem to be efficacious ion for such matters.

uestion often discussed in veterinary circles, animals affected with infectious diseases be used for industrial purposes, is a point annot be settled off-hand, Dr. Esser thinks. r is quoted to the effect that the preparation ground bone is insufficient to destroy the f splenic fever.

POLLUTION OF RIVERS BY SEWAGE.

unty Court Judge of Cheshire has recently decision, under the 'Rivers Pollution Act, 1876', importance, and involving so considerable a of troublesome points, that it is to be hoped decision of a superior Court will be sought. ceedings were taken by the Corporation of against the owners of sundry houses in Park, the sewage of which finds its way into er Dee through several channels, some thers indirect. The sewage of some of the in question is conveyed by a covered sewer k, and the overflow from this tank finds its ng an open brook, or ditch, on the defendants' o the river. Some of the sewage follows the of other brooks, but none of it is subjected defendants to any treatment for the purpose fying it before reaching the river. Under rcumstances, the Corporation contended that endants had committed an offence against 3 of the Act above mentioned. This section s as follows :—'Every person who causes to ow, or knowingly permits to fall or flow, or to ed into any stream, any solid or liquid sewage shall (subject as in the Act mentioned) be to have committed an offence against the

lefence offered was threefold, and was framed nsiderable astuteness. In the first place the nts said that they were not responsible for age going into the river, because the ditches which it passed were 'sewers within the g of the "Public Health Act, 1875",' and, as ere vested not in the defendants but in the ation themselves: Secondly, that the drainage ments in operation were actually prescribed Corporation five years ago, and made com- on the defendants: Thirdly, that the River here the sewage falls into it, is not a stream the meaning of the 'Rivers Pollution Act', ch as it is tidal water, and, as such, is by 20 excepted from the operation of the Act.

The County Court Judge decided against the defendants on the two first points, but in their favour on the third point, and therefore, as a whole, the proceedings failed.

In order to arrive at a conclusion as to whether the River Dee at the *locus in quo* could be said to be 'tidal', the Judge appears to have gone into a great variety of evidence, and to have consulted divers sources of information, not only legal but astronomical. Moreover, both plaintiffs and defendants during several months caused measurements to be taken to discover whether there were any tidal influences in the river at the place where the sewage was discharged. The general result was, that out of 366 tides 113 passed the place in question, rising in perpendicular height from a few inches to more than four feet. The Corporation contended that water was not 'tidal' unless subject to the flux and re-flux of the tide, at a medium high tide, between the springs and neaps. But the Judge declined to commit himself to any subtle astronomical definitions, and, considering that a place where tidal influences were discoverable was a 'tidal' water within the 'Railway Clauses Act, 1863', he thought himself justified in utilising the 'Railway Clauses Act' in the interpretation of the 'Rivers Pollution Act', in the absence of any very distinct definitions in the latter Act.

In giving his decision on the main point, the Judge remarked that the Corporation were not entirely without redress for the serious nuisance which evidently arose from the negligent conduct of the defendants in regard to their sewage. He pointed out that the legislature had seemingly anticipated the very difficulty which had arisen at Chester, for the Act provided that, notwithstanding a stream being tidal water, it was competent to the Local Government Board, after local inquiry and on sanitary grounds, to declare that it was a stream down to such a point as to that Board seemed proper.

Here the matter ends for the present, but it is quite evident that it cannot stop where it is. The very necessity of the case renders it the duty of the Corporation to proceed farther, with all convenient speed, in some one or other of the directions hinted at by the County Court Judge.

SMALL-POX NURSES AND RE-VACCINATION.

ONE of the strongest arguments adduced in favour of the protective influence of re-vaccination is the almost absolute freedom from small-pox enjoyed by those officers and nurses of small-pox hospitals who have undergone that operation. This immunity the opponents of vaccination, when they do not deny it altogether, attempt to explain on other grounds than re-vaccination, but their arguments are based either on a comparison of things totally dissimilar, or on hypotheses which are not in accordance with fact.

Two such attempts have recently been made, and we shall endeavour to point out the principal fallacies contained in them.

In a recently published letter, Mr. P. A. Taylor, M.P., calls attention to the statement of the Chairman of the Fulham Small-pox Hospital, that, of 295 officers and nurses engaged at that hospital, 4 contracted small-pox. In Mr. Taylor's report of the statement, however, a very essential part has been omitted. With regard to the four who contracted small-pox, it was stated by the Fulham Hospital Chairman that the small-pox 'commenced within a few days after they entered the service, and ran concurrently in each case with re-vaccination'. This latter remark concerning the concurrence of the two diseases is of small moment to the uninformed mind, (and we regret, therefore, that a public statement on so important a matter should not have been more explicit), but to those who are acquainted with the phenomena of these diseases it is of very great importance. The incubation period of small-pox is about fourteen days, while re-vaccination begins to show itself on the third day, hence, if the two diseases ran concurrently, it is obvious that small-pox must have been incubating when the operation of re-vaccination was performed. Hence the statement resolves itself into this, viz., that (excluding 42 who were protected by a previous attack of small-pox, and 4 who were already incubating small-pox at the time of re-vaccination), of 249 who were successfully re-vaccinated, not one afterwards contracted small-pox. This, too, is in accordance with the experience of the other hospitals of the Asylums Board. Thus at Deptford Hospital, during the last three years, Dr. McCombie informs us, 265 officers and servants were employed; of these 65 had had small-pox before entering the service, one escaped re-vaccination and developed small-pox, another developed small-pox eight days after re-vaccination (*i.e.*, re-vaccination was performed six days after small-pox was contracted), and of the remaining 198, who were all successfully re-vaccinated, not one contracted small-pox. At Homerton Hospitals, moreover, and at the Hospital-ship *Atlas*, we are informed that not one of the staff who had been successfully re-vaccinated by the medical officer before entering duty contracted small-pox.

Even granting, however, that Mr. Taylor is correct in saying that of 253 officers and nurses re-vaccinated four afterwards developed small-pox, the inference he draws is altogether erroneous. This ratio, he declares, 'as compared with the totality of cases to the whole population', is far in excess of the latter, and is 'much nearer the ratio of cases to population as it existed in the worst epidemic of small-pox in the unprotected London of last century'. To compare the number of cases occurring among the nurses of a small-pox hospital to the number among the population of London of the present day is, we need hardly point out, entirely fallacious; only a small proportion of the inhabitants of London are exposed to the contagion of small-pox, while the nurses of a small-pox hospital are constantly so exposed. To the comparison with the proportion of cases to population in the last century the same objection cannot be raised, because small-pox at that time raged continuously in London, and the Metropolis might not inaptly be compared to a huge small-pox hospital—which, but for vaccination, a large part of it might be at the present time. In drawing the comparison, however, some vital points have been overlooked. Mr, Taylor has taken the greatest mortality in any one year in the last century to have been under 4,000 in an estimated population of 1,000,000, and from this, on the hypothesis that the mortality was 20 per cent., he has calculated the number of cases to have been 20,000 in the same population. But, according to Dr. Farr, the average annual deaths from small-pox in the years 1771-80 were over 5,000 per 1,000,000 living, hence the greatest mortality in any year must have been not under 4,000, but over 5,000, while the number of cases would have been over 25,000; hence the proportion of cases to population would have been, not 1 in 50, as Mr. Taylor calculates, but 1 in 40. Among the staff at Fulham, deducting from the 295 total staff 42 who, the Chairman said, were protected by a previous attack of small-pox, the proportion of cases was about 1 in 63, and making due allowance for the effects of improved sanitation, this ratio does not, perhaps, materially differ from the other. The comparison, however, is illogical. It is drawn between 253 persons wholly unprotected (*i.e.*, on the assumption that re-vaccination is no protection), and 1,000,000 persons, of whom a very large proportion were protected by a previous attack of small-pox. In the last century small-pox was, as we have remarked, continuously present in London; it caused annually about 4,000 deaths, and must, on the percentage mortality assumed, have attacked yearly about 20,000 persons in an estimated population of 1,000,000. In any year, therefore, the number of persons protected by a previous attack of small-pox must have been enormous. What it was we may roughly guess by comparing the small-pox of that time with the scarlet fever of the present. This latter disease, during the last twenty years, has caused annually about 2,800 deaths in a population of over 3,000,000, or, taking the mortality as 10 per cent., it has attacked every year about 28,000 persons in this population, or less than 10,000 in an estimated population of 1,000,000. This ratio is only one-half that of small-pox in the last century, and as it is comparatively rare to find an adult who has not in childhood passed through an attack of this disease, it must have been much more rare in the last century to have met with an adult who had not already had small-pox. Deducting, therefore, from the total estimated population those persons who were protected by having already suffered from small-pox, the ratio of cases of small-pox in the severest epidemic year of last century among the remaining susceptible population must

have been nearer 1 in 20 than 1 in 50. The comparison, therefore, thus instituted by Mr. Taylor, proves exactly the reverse of what he asserts it proves; it shows that re-vaccination must have at least some protective influence.

The other attempt at explanation, to which we have alluded, is made by another newspaper correspondent, 'W. H. C.' Speaking of the nurses of small-pox hospitals, he says:—'Admitting that they are comparatively free from small-pox after being re-vaccinated, what is there more remarkable in this than the almost perfect immunity which doctors in good (*sic*) practice seem to have from all diseases not constitutional?' Physicians, it is true, do but rarely contract infectious diseases, but that is so because they have, as a rule, in childhood, already passed through those diseases with which they usually come in contact. When they have to deal with a disease from which they are not thus protected, they rarely escape. How the resident physicians in fever hospitals suffer we have had occasion to describe at page 330, and if, moreover, 'W. H. C.' had been aware of the fearful mortality among the Irish physicians during the great fever epidemic of 1847-48, he would hardly have ventured to make the absurd statement we have quoted. Experience teaches, not that the physician is by virtue of his profession protected from infectious disorders, but that, by reason of his exposure, he suffers from these more than others.

In a word, there is no parallel to the immunity from small-pox enjoyed by small-pox nurses, and here is no explanation save the fact of their being re-vaccinated. We are, therefore, still able to assert, without fear of successful contradiction, that, within certain limits of time re-vaccination, successfully performed, is an almost absolute protection against small-pox.

THE COMPULSORY NOTIFICATION OF INFECTIOUS DISEASE.

WE publish to-day an interesting communication from Mr. Lowndes, which gives a clear and unbiassed description of the present position of the question of the compulsory notification of infectious disease in Liverpool. The attitude of the medical profession towards this subject is well worthy of study at the present juncture. The absolute need of some form of notification of the presence of infectious disease, in order to prevent its spread, has been affirmed again and again by many different and independent bodies—by Sanitary Associations, by the British Medical Association, by the Joint Committee of this body and the Social Science Association, by the Royal Sanitary Commission, and last, but not least, by many Medical Officers of Health. These last witnesses are constantly affirming their inability to cope with epidemics unless they have the power of dealing with the first cases that arise. With such testimony in its favour, it is surprising, at first sight, that any of the members of a life-saving profession should be adverse to the adoption of such a measure. At the outset of an undertaking of this kind it is, however, not to be wondered at that the means by which it is to be carried out should meet with some cavilling, or even opposition. In the first instance there is sure to be some misunderstanding or doubt as to the ultimate bearing of the measure. The natural conservatism of our race, also, will ever come in aid of the *status quo*.

It is evident from the letter to Dr. Taylor from a local practitioner, quoted without comment by Mr. Lowndes, that he at least understands that adhesion to the Liverpool plan would involve a breach of 'professional confidence'; and yet the proposed Sanitary Acts only require the notification by the medical attendant to be made to the person in charge of the case, surely no very serious obligation, nor one deserving of such an epithet as is applied to it. But it is not probable that the members of the Medical Society were thus misled, and we must search, in their case, for other motives. We have, indeed, reason to rejoice that the reasons given in Mr. Harrison's letter are none of them directly antagonistic to notification as such. In the opinion of the members of the Medical Institution other means have not yet had a fair trial, and the time has not arrived for the employment of any compulsory measure. For these reasons, together with some fears as to the practical results of notification, the medical men of Liverpool decline to recommend the adoption of the measure.

Here, then, issue will have to be joined, and the battle fought out—in both cases by means of evidence. 1st. Is it true 'that the anticipated advantages to the public health have not followed the adoption of similar clauses, and that serious inconveniences to the community have resulted therefrom'. Our own impression is very strong that all the Medical Officers of Health of the places where similar Acts are in force, would answer this question decidedly in the negative.

Again, in the second place, is it reasonable to anticipate more favourable results from a longer trial of the existing means of limiting infection. Dr. Taylor, the Medical Officer of Health fo Liverpool, is able to prove that one of the mean relied upon, the Dairies, Cowsheds, and Milkshop Orders, is useless without the notification of in fectious disease; and in regard to the other means mentioned, if we may judge of the future from the past, there is little to justify reliance upon them. In spite of the acknowledged readiness of medical practitioners to endeavour to prevent infection, the zymotic death-rate for Liverpool has always been one of the highest in the country, and its general death-rate is actually the heaviest in the kingdom. We cannot think that an average of more than 2,000 deaths per annum from infectious diseases alone is an encouragement to rest satisfied with the ordinary methods of meeting them.

Although the motive is not acknowledged in Mr.

Harrison's letter, we suspect that the real objection to the new enactments lies in the idea of compulsory service. No one likes to be compelled to do acts that would be done readily enough voluntarily. And yet the compulsion involved in the notification of disease is such a very small matter after all! The medical man is obliged, under penalty, to do, in a formal manner, that which he would, in any case, do in an informal one. He must give notice to the householder of the fact of the presence of infection, and for this notice he will be paid—this is all. We would call upon the medical profession to remember that all citizens are liable to compulsory service of one kind or another, and would beg them to remember that from several of these they are themselves exempt. Is the sentimental grievance involved in compulsion worthy of being opposed, for an instant, to so simple and beneficent a measure as the notification of infectious disease?

NOTES OF THE MONTH.

LOW DEATH-RATE IN INDUSTRIAL DWELLINGS.

During the half-year ending December 31st, 1881, the Newcastle Industrial Dwellings have exhibited the low average death-rate of 8 in the 1,000; the birth-rate during the same period showing an average of 42 in the 1,000. These results are the more gratifying when it is remembered that this block of dwellings is situate in the lowest part of the town, and is inhabited exclusively by the worst-paid section of the labouring class. These buildings are under the personal superintendence of Mr. J. Price.

SMALL-POX ON THE TYNE.

Considerable excitement has prevailed in South Shields recently, owing to the prevalence of small-pox in that borough. It appears that a sailor belonging to a coasting vessel, whilst suffering from the disease, came ashore frequently, and, within two days of his death, got into the midst of a crowded audience at a place of amusement; in several cases the disease has been traced to this source. We are glad to learn that, by the combined energetic efforts of the Medical Officers of the Port Sanitary Authority, and the Medical Officer of Health for South Shields, the epidemic has been thoroughly stamped out. When it is considered that no less than 15,591 vessels have arrived in the Tyne within twelve months, and that there is at present but one inspecting officer on the staff of the Port Sanitary Authority, it is obviously impossible for one person to exercise vigilant supervision over more than a mere fraction of the vessels entering the port; it is, therefore, the imperative duty of all masters of vessels in which cases of sickness occur to report the fact, immediately on arrival, to the Medical Officers or Sanitary Inspector, the neglect of which duty often entails serious consequences. Masters of vessels have been fully apprized as to what is required of them in this matter. A sub-committee of the Tyne Port Sanitary Authority has been appointed to consider the whole question, and report to the Authority.

THE AMALGAMATION OF MEDICAL DISTRICTS IN DEVONSHIRE.

The question of the advisability of amalgamating the Buckland Monachorum and Whitchurch and South Lidford Medical Districts has long been discussed by the Tavistock Board of Guardians, and at last a definite decision has been arrived at. Some years ago the districts were amalgamated, but for some reason they were shortly after again divided. On the resignation, however, of Dr. Willis, who was Medical Officer for the Buckland district, some time ago, the advisability of returning to the old arrangement was considered; and, notwithstanding signs of opposition from the Local Government Board, it was decided to allow Dr. Butters, the only applicant, who already held one-half of the district it was proposed to amalgamate, to take the united one at a salary which would effect a saving of £10 a year. Much correspondence has since passed between the Guardians and the Local Government Board, who have decided not to sanction the proposal for the amalgamation of the districts named, and trust that the Guardians will now proceed in due course to the election of a Medical Officer for the Buckland District in succession to Mr. Willis. The Tavistock Guardians have consequently decided to advertise for a Medical Officer for the Buckland District from Lady-day.

THE DECENNIAL CENSUS.

Under this heading Dr. Russell, Medical Officer of Health for Glasgow, examines, by the returns of Glasgow, the plan ordinarily adopted by the Registrar-General for calculating the population, especially of urban districts, and that adopted by himself. He shows that the population of Glasgow in 1881 was calculated by the Registrar-General at 601,266, and by himself at 538,128 persons, whilst the census showed that there were only 511,520 inhabitants, or 89,746 less than the number assigned by the Registrar-General, and 26,608 less than the number calculated by himself on a different basis. He also showed that the plan usually followed by the Registrar-General of assuming that the rate of increase which had taken place during the two preceding enumerations had continued during the ten years of 1871-81, was unreliable. The returns for twelve large towns, including amongst them Birmingham, Manchester, Leeds, Sheffield, and others, were *less* than the number calculated by the Registrar-General; for Birmingham, by more than 10 per cent.; for Sheffield and Leicester, by more than 9 per cent.; for Manchester, by nearly 7 per cent., etc. On the other hand, London contained 3.21 per cent. more inhabitants than the calculated number. He then mentioned his own plan of calculating the population, by multiplying the number of inhabited houses, as entered in the City Roll by the Assessor, by the number of inhabitants in each house at the date of the last census. This plan has long been adopted by many Medical Officers of Health, but in the case of the city of Glasgow was erroneous to such an extent that the true death-rate for 1880 was 26.08 per 1,000 population, against 24.68 as given by the calculated proportion. Dr. Russell shows that the error arose partly from an excess in the number of houses returned as 'inhabited', and partly from a slight reduction in the number of residents in each house. He believes that the latter was caused by the great depression in the trade of Glasgow during the last few years. If he had carefully examined his

tables of births he would have had his suspicions aroused, as in 1879 and 1880 the births had considerably decreased as compared with any of the years 1872-78, and that even in 1878 the number was fewer than in any year since 1873. There is no doubt that the plan of calculating the population as recommended by Dr. Russell, checked off by the birth-rate, will give the nearest approach to accuracy in calculating the population of a district. It is, however, not to be considered as absolutely reliable, but only as an approximate number in the absence of more frequent censuses than those now taken. Dr. Russell's little book is worth careful reading by those, and they are many, who have to rely on calculation for the basis of their vital statistics, viz., the population of the district or parish for which they act.

OVERCROWDING IN THE METROPOLIS.

An inquest was lately held on a man who died in a room in St. Pancras which was described as being in a most filthy condition, very small, and quite unfit for human habitation. In this small room, which contained only 600 cubic feet of air, the deceased, his married daughter, her husband and two children lived. The Inspector of Nuisances stated that the house was much overcrowded, and he should serve a notice on the landlord to abate it. In reply to the Coroner, he said that under the provisions of the Sanitary Act, 1866, there is power for the Vestry to compel the registration of all houses let in tenements (lodgings), and to have a notice-board fixed in each room showing the number of persons who might be allowed to live therein. He further stated that this section of the Act was not in force in St. Pancras, although he believed it would work well; and, so far as he knew, was in operation only in St. Giles's. This statement is quite erroneous, as the rooms in very many houses let in lodgings have been measured, and the legal number of inhabitants fixed, in several of the London parishes and districts. For instance, the adjoining parishes or districts of Whitechapel, Bethnal Green, Shoreditch, and Hackney, have obtained the power of making Regulations, and the Act is actively carried out in Whitechapel and Hackney. Houses such as these should be inspected at least once in every year by an Inspector of Nuisances, when much of the overcrowding and bad sanitary condition of the houses inhabited by the poor would be prevented. It is to be hoped that the Vestry of St. Pancras will speedily put this section of the Sanitary Act into operation, and that Marylebone will also do the same, and thus prevent, in these large parishes, scandals such as those which have lately been brought before the public.

AIR-HEATING.

A paper read at the last Sanitary Congress at Vienna, by Professor Fischer, dealt with the general question of heating by means of warm air, for which system the advantage is claimed of a wider range of temperature than is attained by the steam or hot-water systems. In his refutation of several objections commonly urged against the system, the Professor formulated the general theory that a large supply of air at a moderate degree of heat is more efficacious in its action, and presents less sanitary disadvantages than a smaller quantity at a relatively higher temperature. Professor Fodor, in the subsequent discussion, pointed out the fact that the process of air-heating does not diminish the quantity of moisture in the air thus treated. He confirmed Professor Fischer's disapproval of too high a temperature. The smallest particles of dust become under such circumstances the source of irritation to the respiratory organs. In connection with the latter subject, the necessity of keeping clean the pipes and heating apparatus in general was commented upon. Amongst the advantages claimed by Prof. Fodor for the system of air-heating are the facilities it affords for controlling the purity of the air, and for being used in conjunction with perfect ventilating appliances.

THE SANITARY STATE OF REDDITCH.

We have on previous occasions had much to say about the incompetence and ignorance that appears to prevail amongst the sanitary guardians of Redditch. At the last meeting of the Local Board a death-rate of 28.9 per 1000 was referred to in complacent terms, and the existence of ten cases of scarlet fever in the place was regarded with equanimity, since 'children would be almost certain to suffer from it, as isolation was almost impossible in poor houses'. The provision of an infectious hospital, which was so strongly and earnestly urged by Mr. Page, the late Health Officer, was not even referred to by any of the speakers; and it is greatly to be feared that the same bungling that characterised the sanitary administration of Redditch when Mr. Page brought the light of publicity to bear upon it still rules it now.

THE SIGNIFICANCE OF WATER ANALYSES.

The inferences to be deduced from given analytical statements as to the composition of waters in use for drinking purposes have long been a source of contention between rival schools of chemists. To the outside world both creeds have seemed equally far-fetched and erroneous; and the opinion has been gradually growing amongst sensible men, that something more is wanting to decide whether a water is wholesome and innoxious than the position of a decimal point in the proportion of a particular chemical body to a million parts of water. A departure of a very important character has, however, now been made with this object by the Local Government Board, who have devoted a portion of the grant allowed them by Parliament for auxiliary scientific investigations to an inquiry described by their Medical Officer as 'some very interesting examinations of the significance to be attached to current methods of chemical analysis of potable waters'. Inasmuch as it is mainly with the view of ascertaining its freedom from organic contamination that water is chemically tested, the samples examined under the direction of the Department have been chiefly of water purposely polluted with the stools of enteric fever patients. Although the inquiry is not in a sufficiently advanced stage for report, enough has been learned 'to show that these examinations were greatly needed in correction of judgments commonly pronounced about the wholesomeness and unwholesomeness of samples of water that have been the subject of analysis'. The inquiry is one of the deepest interest, both practically and scientifically, and in view of the terms in which its results are spoken of, it is much to be hoped that the complete report of the investigation will be made public without undue delay.

THE PUBLIC HEALTH

DURING JANUARY 1882.

THE mean temperature of the air at the Royal Observatory, Greenwich, was 40°.4 during January, and exceeded by 4°.1, the average January temperature during 100 years. The mean showed a considerable excess during the first fifteen days of the month, whereas it was below the average during the eleven days ending the 26th; it was again above the average on four of the last five days of the month. Rain was measured at Greenwich on but ten of the thirty-one days of the month, to the aggregate of 1.4 inches; this amount was half an inch below the average January rainfall during the last 61 years. The sun was above the horizon during 259.1 hours in January, but only 15.8 hours of bright sunshine were recorded at Greenwich; the amount of bright sunshine recorded in the first month of the four years 1877-81 averaged 31.0 hours. South-westerly winds generally prevailed throughout the month, until the last two days, when the wind was easterly. From the beginning of the present year, the list of large towns dealt with in the Registrar-General's weekly return was enlarged, so as to include all those towns which, at the recent census, had an enumerated population exceeding 70,000 persons. The following eight towns were thus added to the Registrar-General's list:—Derby, Birkenhead, Bolton, Blackburn, Preston, Huddersfield, Halifax, and Cardiff.

In the twenty-eight large English towns now dealt with in the official weekly return, 23,780 births, and 15,540 deaths were registered during the four weeks ending the 28th ult. The births were equal to an annual rate of 36.7 per 1000 of the aggregate population of the twenty-eight towns, which is estimated to the middle of this year at little short of eight-and-half millions of persons. The birth-rate in the twenty towns dealt with in these returns in January 1881, was equal to 36.5 per 1000. The lowest birth-rates in these towns last month were 26.7 in Halifax, and 32.5 both in Portsmouth and Bradford; the rates in the other towns ranged upwards to 40.7 in Derby, 41.0 in Nottingham, and 41.3 in Preston. The birth-rate was equal to 36.1 in London, while it averaged 37.2 in the twenty-seven provincial towns.

The annual death-rate in the twenty-eight towns during the four weeks of January, averaged 24.0 per 1000; the rate in the twenty towns in the corresponding month of the three years 1879-81, was equal to 27.6, 26.0, and 26.2 per 1000 respectively. The rate last month was considerably below the average January death-rate, and was almost identical with the rate that prevailed in the last month of 1881. The lowest rate of mortality in these towns during last month was 17.6 in Derby. The rates in the other towns, arranged in order from the lowest, were as follow:—Halifax, 18.3; Leicester, 18.4; Bradford, 19.1; Bristol, 20.8; Portsmouth, 20.8; Norwich, 20.9; Birkenhead, 21.5; Hull, 22.2; Bolton, 22.2; Birmingham, 22.4; Sheffield, 22.5; Leeds, 22.6; Newcastle-on-Tyne, 22.7; Sunderland, 22.8; Cardiff, 23.0; Huddersfield, 23.6; Plymouth, 23.7; Blackburn; 23.9; London, 24.4; Manchester, 25.0; Wolverhampton, 25.2; Salford, 26.1; Liverpool, 27.6; Nottingham, 27.7; Oldham, 28.0; Brighton, 28.5; and Preston, 29.6. The death-rate last month was equal to 24.4 in London, and averaged 23.6 in the twenty-seven provincial towns, which have an estimated aggregate population somewhat exceeding that of London.

The 15,540 deaths from all causes in the twenty-eight towns during the four weeks of January included 783 from whooping-cough, 502 from measles, 424 from scarlet fever, 211 from 'fever', 169 from diarrhœa, 116 from diphtheria, and 100 from small-pox. Thus 2,305, or nearly 15 per cent. of the deaths from all causes, were referred to the principal zymotic diseases; these were equal to an annual rate of 3.6 per 1000 in the twenty-eight towns, and showed a slight decline from the rate that prevailed in the previous month. The zymotic death-rate last month was equal to 3.8 per 1000 in London; in the twenty-seven provincial towns it did not exceed 3.3, and ranged from 0.9 and 1.0 in Derby and Halifax, to 5.5 in Nottingham, 6.1 in Hull, and 6.4 in Brighton.

Whooping-cough was, as it had been in December, by far the most fatal zymotic disease in the large towns during January. The annual death-rate from this disease, which had been equal to 0.38, 0.56, and 1.02 in the three preceding months, further rose to 1.21 in January; in January 1881 the rate from whooping-cough in these large towns did not exceed 0.65. The fatality of whooping-cough was more than thrice as great in London last month as in the provincial towns, among which the highest death-rates from this disease were 2.1 in Brighton and 2.3 in Salford. The death-rate from measles in these large towns, which had been equal to 0.44, 0.70, and 0.92 in the last three months of 1881, declined again to 0.77 in January; this, however, considerably exceeded the rate from measles in January 1881, when it did not exceed 0.46. The highest death-rates from measles in these towns were 1.7 in Nottingham, 2.1 in Leeds, 2.2 in Norwich, and 3.2 in Preston. The rate of mortality from scarlet fever also declined to 0.65 per 1000, from 1.02 and 0.87 in the last two months of 1881, and was slightly below the rate in the corresponding month (January) of last year; the average rate in the provincial towns was nearly twice as high as that which prevailed in London. The highest death-rates from scarlet fever during last month in the provincial towns were 2.3 in Brighton, 2.4 both in Nottingham and Sunderland, and 4.8 in Hull. Scarlet fever caused 59 more deaths in Hull during the four weeks of January, raising the fatal cases of this disease recorded within that borough since the 1st July last to 701; the annual death-rate, however, which was equal to 11.2 per 1000 in October and November, has since declined, as above stated, to 4.8 in January. Fever (principally enteric) caused 211 deaths in the twenty-eight towns during January, of which 94 occurred in London and 117 in the twenty-seven provincial towns. The annual death-rate from fever showed a further decline from that which prevailed in recent months, and averaged 0.33 in the twenty-eight towns; the 'fever' rate was highest during January in Hull, Newcastle-upon-Tyne, and Preston. The fatality from diphtheria, although showing a decline from that recorded in recent months, was again above the average; the death-rate from this disease was equal to 0.18 per 1000, whereas in the corresponding month of last year it did not exceed 0.10. The 116 deaths from diphtheria in the twenty-eight towns included 58 in London, 35 in Portsmouth, 6 in Birmingham, and 4 in Nottingham; the epidemic in Portsmouth showed no sign of decline, the fatal cases, which averaged little more than 17 during the twelve months of 1881, having been 35 during the four weeks of January. During January, 100 deaths from small-pox were registered in the twenty-eight towns, the corresponding annual rate showing a decline from that which prevailed in the previous month. Of these 100 fatal cases no fewer than 85 occurred in London; the remaining 15 included 3 in Nottingham, and 2 each in Brighton, Bolton, Salford, Oldham, Leeds, and Hull. Judged by the returns of the Metropolitan Asylum Hospitals, the prevalence of small-pox in London showed a further increase during January. The number of small-pox patients under treatment in these hospitals, which had been 453, 457, and 485 on the last Saturdays of the three preceding months, further rose to 490 at the end of January; the last number included 96 in the Convalescent Hospital at Darenth. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 52 and 78 in November and December, rose to 84 in January. By far the largest proportional fatality of small-pox in the Metropolis during last month was recorded in the south-eastern group of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year to births registered, averaged 15[illegible] per 1000 in the twenty-eight towns last month, showing a decline of 14 from the proportion prevailing in December. This proportion of infant mortality was equal to 151 in London, while it ranged in the provincial towns from [illegible]

and 100 in Norwich and Derby, to 183 in Wolverhampton, 193 in Huddersfield, and 227 in Preston.

The fatality of diseases of the respiratory organs, judged by the Metropolitan returns, showed a further increase during January. The average weekly number of deaths referred to these diseases in London, which had increased from 159 to 443 in the last four months of 1881, further rose to 482 in January; this number was, however, 26 below the corrected average weekly number in the corresponding months of the last ten years. The annual death-rate from these diseases in the Metropolis, which had increased from 2.2 to 6.0 per 1000 in the four preceding months, was equal to 6.5 in January. The annual death-rate from these diseases during last month was equal to 8.7 in Liverpool and 6.0 in Salford.

During the four weeks of January the causes of 407 deaths in the twenty-eight towns were not certified either by a registered medical practitioner or by a Coroner. These uncertified deaths were equal to 2.6 per cent. of the total deaths registered, showing a slight further increase upon the proportions in recent months. The percentage of uncertified deaths did not exceed 1.0 in London, whereas it averaged 4.0 in the twenty-seven provincial towns; the proportion of uncertified deaths was less than 1 per cent. in Plymouth, Wolverhampton, and Derby, whereas it ranged upwards in the other towns to 7.3 in Salford, 7.6 in Halifax, and 8.6 in Huddersfield.

Among the population of little less than a million persons estimated to be living in the outer ring of suburban districts round London, the annual death-rate from all causes during January was equal to 18.8 per 1000, and was also identical with that that prevailed in the preceding month. The annual death rate from the principal zymotic diseases was equal to 2.0 per 1000, against 2.0 and 2.3 in November and December. The fatal cases of small-pox in the outer ring were 15 during the four weeks of January, 7 of which occurred in the West Ham sub-district. Whooping-cough showed a considerable increase of fatality and caused 76 deaths; 24 deaths from measles, and 34 from scarlet fever, were also recorded.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on Friday, January 20th, Dr. J. W. Tripe, President, in the chair.

DUTIES OF A MEDICAL OFFICER OF HEALTH.

In relation to this subject which had been discussed at the last meeting (see SANITARY RECORD for January 15, page 289), the Council brought up the following report:—

'The Council having considered the question referred to them by the Society, concerning the duties which some Sanitary Authorities have desired their Medical Officer of Health to undertake, and which ordinarily form no part of his duties, as defined by the Public Health Act of 1875, the Metropolis Local Management Act and other general Acts, or by the orders of the Local Government Board, beg to report that they recommend the Society to express the opinion that it is inconsistent with the position and duties of a Medical Officer of Health to undertake, himself, or by his officers, to purchase horses or plant for the removal of refuse from the houses or streets, or to directly superintend the removal of house or street refuse. That it is no part of the ordinary duties of a Medical Officer of Health to attend in-patients or superintend the management of a hospital for infectious disease. That it is undesirable that the Medical Officer of Health should himself conduct the prosecutions before the magistrate.

The following gentlemen were nominated as Associates of the Society:—F. W. Hicks, M.D., Peter Burgess, M.D., G. D'Arcy Adams, M.D., Carl Renner, M.D., B. A. Whitelegge, M.D., B.Sc. The following gentlemen were nominated as extra-Metropolitan Members of the Society:—C. S. Ticehurst, Esq., Medical Officer of Health for Petersfield Rural District, Alfred E. Harris, Esq., Medical Officer of Health for Sunderland.

THE SCOPE OF THE DUTIES OF A METROPOLITAN MEDICAL OFFICER OF HEALTH.

Dr. JAMES STEVENSON asked whether it could be considered incumbent upon a Metropolitan Medical Officer of Health to undertake to make experiments, with a view to ascertaining the pressure of air in sewers.

The PRESIDENT read the 132nd section of the Metropolis Local Management Act, 1855, and pointed out that the duties as defined by this clause were sufficiently vague to warrant a Local Authority in expecting the assistance of a Medical Officer of Health in a matter which had relation to the prevention of disease.

Dr. BATE raised the question, whether a Medical Officer of Health for this purpose could be expected to leave his district.

In reply to a question, a Health Officer who had been sent into the North of England for the purpose of obtaining information for his vestry, stated that he had received no extra remuneration for this service.

The question was also asked, whether a Medical Officer of Health were qualified in making inquiries of the friends of a sick person, concerning the disease from which the latter was suffering, if there were reason for believing that the medical attendant had certified wrongly on this point. In the discussion, the opinion was expressed that the Health Officer, under these circumstances, was justified in satisfying himself on this point, but that it was obvious that this could be done without discrediting the medical attendant.

THE PRACTICAL WORKING OF DIRECT VACCINATION FROM THE CALF.

Dr. BROWNING read a paper on this subject. Members of the Society had doubtless placed the practice of thorough primary vaccination, or re-vaccination, in advance of complete isolation and disinfection, but some may have witnessed cases of small-pox occurring within a comparatively short time after vaccination. To these, some account of vaccination from the calf will have an especial interest.

The use of calf lymph should be preferred for these reasons: humanised lymph is not easy to procure on an emergency, it sometimes fails to afford the desired protection, it may be thought to be the means of conveying constitutional infection, and so people refuse to be vaccinated. Calf lymph is available on the briefest possible notice, it never fails in preventing small-pox, it is not known to have ever produced any bad symptoms or transmitted any disease from animal to man. Calf lymph can be now sent immediately anywhere from London, as was lately done at midnight, and three hundred men were vaccinated by noon next day.

A table, by Dr. Collie, showed that 538 vaccinated persons of all ages and sexes suffered from small-pox, some of whom contracted small-pox within a short period after vaccination, leading to the conclusion that they had been vaccinated with lymph of enfeebled protective power. *Per contra*, 150 persons were vaccinated with calf lymph, and none contracted small-pox. Reliable evidence is wanting of the possibility of the transmission of any infection, but the syphilitic and scrofulous taints, by means of humanised vaccination, and the instances reported must have been due to criminal ignorance or negligence on the part of the operator. Erysipelas may have followed the use of a dirty lancet, or of putrescent lymph, or some skin affections in badly-fed children, but these are not fairly chargeable to vaccination. As to animalised vaccination, we may say for certain, that no other virus can be passed from beast to man by vaccination with pure animal lymph. Healthy animals are always selected, while the vaccination of unhealthy animals is always unsuccessful.

The possibility that tuberculosis and anthrax shoul introduced into our systems is negatived by the certainty that they take their right place in the ranks of the microbic infectious diseases, and that their specific micro-organisms can readily be seen. The following objections have been made to calf vaccination:—1st. That in direct vaccination

from the animal to man, there is considerable probability of failure; 2nd. That papulo-vesicular eruptions are specially induced by it, and that it is followed by phlegmenoid symptoms; 3rd. That the local as well as constitutional disturbance is more severe than after humanised vaccination. With regard to the first objection, Dr. Renner's percentage of success is 98.3 per cent.: Dr. Warlomont gives that of the Belgian physicians as 96 per cent.; Dr. Browning's, in upwards of 1000 vaccinations and re-vaccinations, is 97.13 per cent. Dr. Renner, since May last, vaccinated 186 calves, without failure. The author had not once been disappointed in obtaining satisfactory results from any of seventeen animals he employed. Concerning the second point, Dr. Renner's experience corroborates Dr. Browning's in contradicting this statement. With reference to the third objection, neither Dr. Renner, Dr. Cory, Dr. Warlomont, nor the writer, had seen any of these alleged severe consequences.

In March last, the author selected two calves three weeks old, shaved the hair behind each wither, and vaccinated one by scarification with lymph of the Beaugency stock, the animal subsequently wearing a cradle. The vesicles rose, and on the seventh day he collected lymph loaded with pus. From some vesicles on the nose he vaccinated the second calf. On the second day after the operation, he perceived several distinct vesicles on its nose, due to its having got out of his cradle and to licking itself and its neighbour. A third calf was placed on the table, shaved and vaccinated, in fifty places, with lymph from the nose of the second; all the places were successful. He then vaccinated fourteen calves in succession without one failure, and obtained over 2,000 points, tubes and glasses.

Calves of one month are best for use; lymph should be obtained in England from Dr. Cory, Mr. Cooke, or Dr. Renner. Calves should be kept in stables, narrow enough to prevent their turning their bodies or necks in the stall. The stable should be reversible, slightly hollowed, with holes to permit the escape of ordure and urine, with a post, two horns, and rings, to which the animal is made fast. A water-bath and drying oven, and a centigrade thermometer, are required in addition to the apparatus for vaccinating and for storing the lymph. The scarification should be done in 50 to 80 places; if another animal be present as a vacciniter, an equal number of punctures will answer better. Lymph on points should be moistened and dissolved with water and glycerine. A vesicle appears after 24 hours; the animal is free from constitutional disturbance. The necessity taught by Warlomont of working with lymph from two sources is contra-indicated if lymph be taken directly the vesicle acuminates. To collect the lymph, the vesicles should be pinched up with forceps on the fifth day, and the vesicle removed with a scalpel, and drained on to a piece of glass; the dry scab is left. The lymph is microscoped, and used for coating points and glasses and filling tubes; the points are subsequently dried in the oven, two glasses are put together, and their edge is plunged into paraffin.

Dr. DRYSDALE felt convinced that arm to arm vaccination would have to be abandoned for animal vaccination; the latter is free from suspicion of human disease. He quoted the evidence of the Pitié Hospital in the early part of the century, when 102 children were vaccinated and subsequently inoculated with small-pox virus, the latter unsuccessfully. In 1869, 875 people were attacked with small-pox, and 215 died, almost all of whom were vaccinated. In 1876, during another epidemic in the same town, Dr. Martin sent calf lymph; Dr. Meyer then found that children who were vaccinated with this lymph escaped. Every vaccinator ought to get a fresh stock of calf lymph every month.

Dr. RENNER urged that animal vaccination affords a protection not inferior to the old system. Dr. Martin had offered a reward of £100 for evidence of an attack of small-pox occurring in any person whom he had previously vaccinated with calf lymph; in only one was the reward claimed, and then the small-pox occurred three days after the vaccination. He doubted whether animal vaccination would replace arm to arm vaccination altogether. Failures with animal lymph were due to the lymph being taken at the wrong time, or to the lymph being badly stored, or to punctures being resorted to instead of scratches. He had never seen a bad arm. The slightest ailment of the calf prevented the development of the vesicle. The objection to animal vaccination was the expense, but this was of small consideration in regard to the importance of the subject. On one occasion he had received a telegram at 10 o'clock at night of a case of small-pox on board an emigrant ship; he was able the next morning to supply lymph for the whole of the ship.

Mr. TURNER gave his experience of an attempt to vaccinate calves, and utilise the lymph, during an outbreak of small-pox, but he did not meet with the success of which Dr. Browning spoke, either in the vaccination of the calves, or in the subsequent vaccination of human beings. He thought that in a scattered district animal vaccination would be impossible.

Dr. CORFIELD said that what was true for animal vaccination was equally true for human vaccination—that to be successful it must be properly performed; and he quoted the evidence of the Metropolitan Asylums Board Hospitals that, where persons were properly re-vaccinated, they might, without exception, come into the closest contact with cases of small-pox without the slightest risk.

Dr. BRISTOWE noted the large proportion of vaccinated people who, at the present time contracted small-pox.

Mr. WYNTER BLYTH thought that the sooner we disabused our minds that vaccination was a perfect prophylactic the better. That to be successful, re-vaccination must be insisted on in each individual. He regarded vaccination as a test of a person's liability to contract small-pox.

After a few words from Dr. Mason, in which he criticised Mr. Blyth's statement, the PRESIDENT said that when he was 16 years of age he slept with a case of small-pox, and did not contract the disease; subsequently he had been twice vaccinated successfully. He should give a preference to animal lymph.

Mr. JACOB called attention to Dr. Buchanan's memorandum, and urged that the protectiveness of vaccination was as great now as when first introduced, and that an examination of the proportion of vaccinated and unvaccinated persons in a community shows very clearly that the unvaccinated suffer from small-pox out of all proportion to the vaccinated.

THE NATIONAL HEALTH SOCIETY.

THE report of the year's work of the National Health Society, presented at its recent annual meeting, includes a record of voluntary work carried out in many directions, and with much success, for the extension and the increase of sanitary knowledge and the strengthening of the means for the prevention of disease.

Sixty-four lectures have been given in various poor districts, addressed to mothers' meetings, working men's clubs, etc., etc., by well-known authorities; Dr. Siemens, F.R.S., Mr. H. Power, Dr. Robert Farquharson, M.P., Professor Fleeming Jenkin, and others having taken part in the work of lecturing.

Mrs. Johnstone's system for the prevention of the spread of fever, carried out with so much success in Hastings, and described in the SANITARY RECORD of June 15, 1880, and June 15, 1881, has been personally explained by her to large audiences at one meeting of mission women, and at another meeting of clergymen and medical men.

Part of the Society's work has consisted in the presentation of street seats and trees for planting in wide thoroughfares, so as to supply shade and rest to wayfarers; the most recent gifts for this purpose are twelve seats, which are placed in Hornsey, and twelve in the New Kent Road. Arrangements are being made, when permission of the vestries can be obtained, for similar work in other districts of London.

A special report was made on 'Dust Removal', which suggested methods of preventing the existing nuisance from the collection of dirt and refuse in house-bins, and the imperfect methods of removal employed in London, which contrast very unfavourably with some of the much better systems in operation in northern towns. This subject is in

the hands of a special committee, who are in active communication with the London parishes.

Upwards of 700 plumbers have attended each of the lectures on the 'Science and Art of Practical Plumbing', given by Mr. Hellyer for the Society and reported in the SANITARY RECORD, June 15, July 15, September 15, and October 15, 1881, and a considerable number of names have been entered for the examinations, and practical demonstrations of skill in connection with these lectures, for which the Society has offered prizes. These examinations will be held in the course of February 1882.

The Society's Pamphlet on Vaccination has been approved and revised by the Local Government Board, and some hundreds of thousands of copies sold at cost price to Unions throughout the country, for house to house distribution.

The part which the Society has taken in abating the smoke nuisance by initiating the appointment of a Smoke Abatement Committee is well known to the public, and will be the subject of a special report.

The whole of the work enumerated has been carried out at an expenditure of something less than £300 during the year.

The accounts were presented and various speeches were made, a vote of thanks being proposed to the Chairman, Mr. Ernest Hart, by General John Cotton, seconded by Mr. Domville. Votes of thanks were also given to the Treasurer (Mr. Lawrence), to the Secretary (Miss Fay Lankester), and others who had assisted in the work of the Society.

Reports were presented showing the satisfactory results of the prizes offered by the Society to the School Board and other schools, in London and Liverpool, for success in the teaching of Domestic Economy and the Laws of Health.

SANITARY AID ASSOCIATIONS.

A MEETING was held at the residence of Canon Farrar, the Canon himself presiding, on the 30th January, to discuss the means by which the spread of infectious disease might be prevented. Many of the district clergy, and ladies and gentlemen had been invited by the St. George's, Hanover Square, and Westminster Committee of the Charity Organisation Society to meet Mrs. Johnstone, of the Hastings Sanitary Aid Association, who was to describe the organisation in the towns of Hastings and St. Leonard's, formed to combat with infectious diseases. The chairman opened the meeting by stating, that when he was residing at Harrow, a little girl visitor caught scarlet fever, through riding across London in a cab. The disease attacked three of his children successively, servants in the house caught it, and finally, Mrs. Farrar was seized with it; in all, nine persons caught it from the one case. The first patient recovered and was removed, but a second attack followed, and she, as well as two other persons who caught the disease from her, died. In Canon Farrar's house there were 60 boys resident; but by isolating the family, and allowing nothing to pass away from the isolated part of the house without disinfection, there was no spread of the disease among the boys, and he adduced this as a proof of the success of isolation and disinfection. Mrs. Johnstone then, in the course of a long address, pressed upon her hearers the fact, that these infectious diseases were preventible, and she then described the course which was adopted by the Sanitary Aid Association of Hastings, the principles of which could be applied to the population of any other town, and are fully described by Mrs. Johnstone in the SANITARY RECORD of June 15, 1880, and June 15, 1881.—Sir Henry Cole thanked Mrs. Johnstone for her interesting address, and urged that by there being a 'guild of health' in every parish, the origin of contagion might be, to some extent, cured.—Dr. Bond said, that by attention to the rules laid down by Mrs. Johnstone, the endeavours of the physician to lessen epidemic disease would be materially aided. Mr. Michael, Q.C., insisted upon the necessity of personal attention being given in each household to sanitary needs in a house. Thanks were voted to Mrs. Johnstone, and it was stated that it is purposed to introduce a Sanitary Aid Association into Westminster on the Hastings model.

MODEL SLAUGHTER-HOUSES.

A PRELIMINARY Public Meeting was held on January 28th, in the Rooms of the Royal Society for the Prevention of Cruelty to Animals, to consider the subject of the reform of the methods of killing animals required for food. Dr. B. W. Richardson took the Chair. Mr. Colam, Secretary to the Society for the Prevention of Cruelty to Animals, said the Baroness Burdett-Coutts had promised £10 annually for the furtherance of the movement. An attempt to direct public attention to the subject, made by the Society he represented, had been met by butchers with a statement that the proposed change would send up the price of meat 2d. or 3d. per lb. Lord Aberdare, the President of the Society for the Prevention of Cruelty to Animals, who still took as warm an interest in the subject as when, during his period of office as Home Secretary, he tried to effect a change by legislation, had collected facts to show that animals suffered cruelties in private slaughter-houses which could be ameliorated in public slaughter-houses. So far from the price of meat being increased by the change of system, he might cite the case of Glasgow, where, after the establishment of a public *abattoir*, the price fell. Dr. Richardson said the present meeting was called to test public feeling on the question. If supported adequately with the moderate means required, the Committee were prepared to show the way to the proposed reform. He then proceeded to state facts which had led him to come to the conclusion that nothing short of the establishment of public slaughter-houses, open at all times to the public view, and subject to constant inspection by skilled persons, would insure the introduction of a satisfactory method of killing animals for food. What was now proposed was that a model slaughter-house should be established, so that the society might be in a position to go to Government with the plan they wish to see adopted. Adopting the system which had been followed by the Jewish people with so much benefit to themselves, there should be careful inspection, and, he should prefer, by skilled inspectors, of every carcass, in order to prevent any diseased meat leaving the slaughter-house. Professor Fleming strongly urged the introduction of a system which worked beneficially on the Continent, and in several of our provincial towns, and which rendered adequate inspection of meat possible. It was resolved to form a society with the objects set forth, Dr. Richardson consenting to act as Chairman, and Mr. H. Francis Lester as Honorary Secretary.

SMOKE ABATEMENT EXHIBITION

AT SOUTH KENSINGTON.

THE Smoke Abatement Exhibition at South Kensington closed its doors on Tuesday, the 14th inst. Its career has been singularly successful, and it has, we believe, more than fulfilled the anticipations of its promoters, in respect to its extent, value, and the impression which it has produced on public opinion.

It has been visited by not far short of 100,000 persons, and among these have been the representatives of all the great architectural institutions, of the building trades, of the great arsenals, and of the Society of Engineers of London, including persons of the highest professional eminence, as well as of a great body of working men in each department. Manchester, Sheffield, Birmingham, and a large number of other municipalities have been officially represented at the Exhibition. The German Government, the French and the American Governments, have deputed special representatives, who have visited the Exhibition, and have expressed their satisfaction with its extent, variety, and usefulness, and have reported to their various Governments officially.

The Exhibition has been repeatedly visited by Royal personages, notably by the Prince of Wales, the Princess Louise, the Empress of the French, and the Governor-General of Canada, all of whom have made a minute examination of the Exhibition, and expressed their great satisfaction with its contents. It is particularly worthy of notice that a great number of medical men, including nearly all the best known

leaders of the medical profession, have shown great interest in the Exhibition, and studied it very carefully. This is, in itself, a most promising sign, as no profession is likely to exercise greater influence on the public mind in utilising this Exhibition than the medical.

Great landowners, such as the Duke of Westminster, have manifested the deepest interest in the Exhibition, and have deputed their architects and builders to report on it to them, demonstrating the principle of each smoke-abating apparatus which could be applied to existing grates in the houses they own, or which could be introduced on the occasion of a renewal of leases.

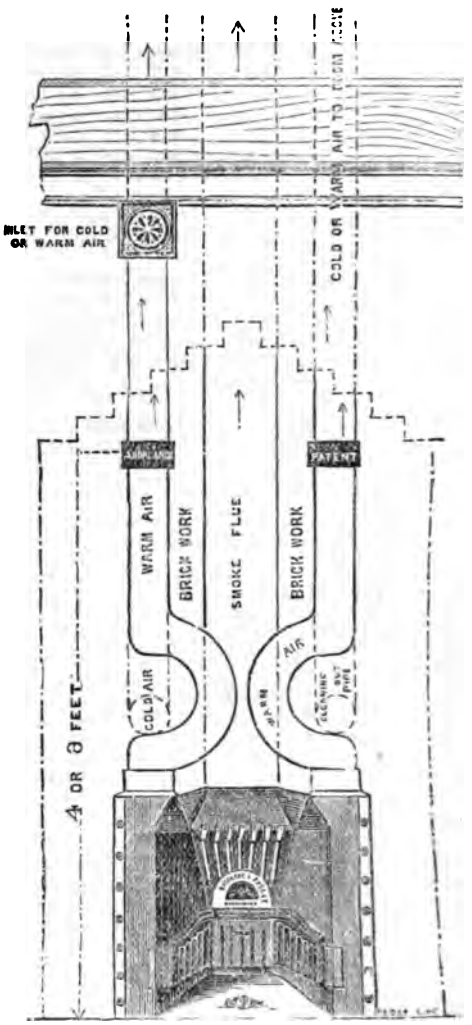
The exhibitors themselves have expressed, as a rule, very great satisfaction with the results of the Exhibition. Large sales have been made by most of them, and some of them have obtained singular commercial successes with their inventions. But beyond this, the Committee have evidence that a great number of persons are waiting the publication of the results of the testings, in order to avail themselves of the most successful products of ingenuity in the consumption of smoke.

Finally, the leading personages in Manchester have resolved to transfer the Exhibition, as far as can be arranged, to Manchester, and a committee has been formed, with the Earl of Derby and the Mayor of Manchester at its head, with this object. This Exhibition, also, will be conducted with the aid, and under the auspices, of the Smoke Abatement Committee. More detailed particulars are given in our advertising columns. The work begun at South Kensington will thus be continued in the North. The testings will be carried on, meantime, until every apparatus for which application has been made has been scientifically tested; the work of the jurors in every section having been conducted with such minuteness, and by men of such great scientific ability, that special interest will attach to their reports and awards. The Lord Mayor of London has issued cards for a dinner at the Mansion House on March 11th, at which the leading persons who have interested themselves in the promotion of this Exhibition, and of this movement, will meet, and when, no doubt, other announcements of public interest will be made as to the further course and progress of this movement.

DOMESTIC GRATES, STOVES, AND KITCHEN RANGES.

(*Continued from page* 304.)

The Manchester Ventilating Grate, the invention of Mr. Shorland, Sanitary Warming and Ventilating Engineer, Manchester, is based upon the principles of smoke-consumption by means of heated air discharged amongst the products of combustion, and the ventilating and warming of other rooms, either on the same floor or on the ones above, by means of a specially constructed warm air-back. One great advantage over any other arrangement is that this back is made in one piece of the thickest hematite iron, so that there are no parts to open and close by expansion and contraction, and to admit of sulphurous gases passing into the warm-air chambers, from which pipes carry the heated air to the required spot. The warm air-back can be applied to any existing grate, so that at a comparatively small cost the principle can be effectively carried out in any house, and three or four rooms may be warmed to an agreeable temperature by the one fire. As the fires in two rooms can well be dispensed with under ordinary circumstances, the production of smoke, in a greater or less degree according to the class of grate that may be fixed in the apartments, is obviated. Mr. Shorland adapts his invention to any kind of stove or heating apparatus, and in connection with the admission of cold air only, without the draught of warm air above described, and of warm and cold air mixed, by means of syphon pipes. The invention has been proved to be a sure cure for smoky chimneys, and there are many thousands of them in use. In the grates shown at the Exhibition, one of which we illustrate, a channel at the bottom of the fire-basket at the back draws in the air, which is carried around the sides, becoming heated in its passage, and is discharged amongst the gases em from the fuel, which it mainly destroys. The bac air chamber is simply formed, in one piece, an the entire surface of the grate; the air to supp of course, best when brought from the external atm The hearth on which the patent back is placed w air before it enters the self-containing air-tight v generating chamber; it then passes up the back a which has seven times as much surface as that part of t



against which the fire plays. Two pipes, as shown, c heated air from the upper part to the floor above, w can be admitted to the room at any height, acco the fancy of the occupant, or, if required to heat a rooms on the same floor as that on which the grate it is sent forward at a lower point; for instance, w floor line. A strong recommendation of these p that they have been largely taken up by the medi fession. Mr. Shorland is a heating engineer experience, and his inventions in this direction hav eminently successful.

Mr. John Court, 136, Brompton Road, S.W., his Patent Smoke-Consuming and Ventilating which differs in one or two of its features from a in the Exhibition. The principal one is, that a mitted along the narrow opening shown at the to range, over the plate rack, in the accompanying This is drawn into a chamber of narrow dimensio back, and, passing down behind the fire, is agai upwards behind the fire-brick sides, and discha heated state through a series of holes in them ove

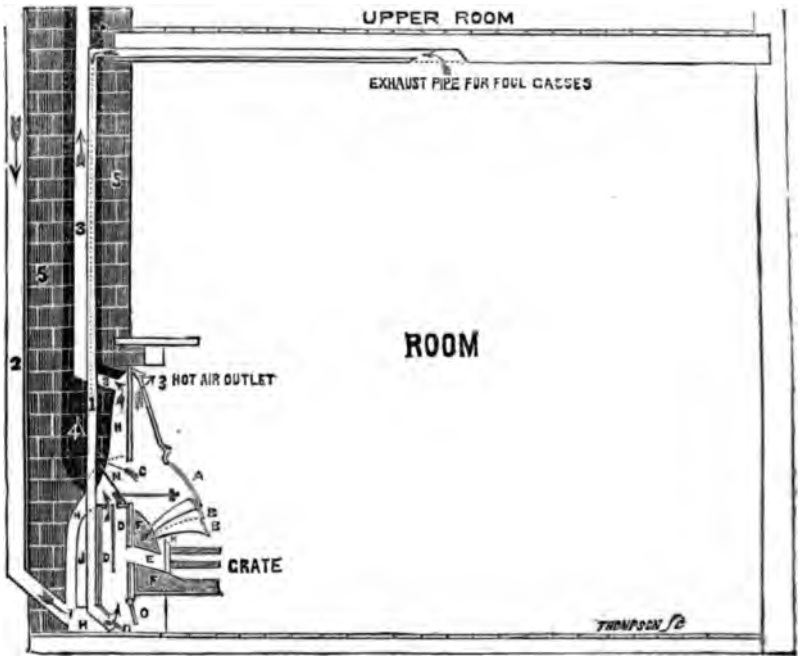
tending materially to consume the gases as they exude from the fuel. The steam and smell arising from the vessels in use on the hot plate is also conducted through the same channel to the fire, consequently no unpleasant savour arises from them. The heated air, mixing with the products of combustion, is carried through the flues around the oven, etc., and effects a complete development of heat from the gases before they reach the chimney. Another arrangement is provided by which a constant stream of highly heated atmospheric air is allowed to enter the oven, which supplies the meat with the necessary amount requisite to give it the flavour of roast meat, and to prevent that stewed or soddened flavour inseparable to viands cooked in ill-ventilated ovens. The fire-box is constructed on the improved form, with a rising bottom to prevent an unnecessary amount of fire being kept in the grate when cooking is not being carried on, yet to keep the hot plate at all times well heated for boiling purposes, and the bars of the grate are vertical, of wrought iron, and loose, that is to say, they can be taken out by the cook, and new ones put in their place when required. Owing to the excellent combustion attained by the admixture of the heated air with the gases of the fuel, the flues do not require that constant cleaning that is usual with ordinary ranges, and once in three months is said to suffice for this purpose. Taken as a whole, Mr. Court's range is a meritorious production in the right direction.

A new grate, called the 'Poor Man's Grate' on account of its inexpensive character, has been recently added to his exhibits by Mr. Stobbs, the Secretary of the Anthracite Coal Owners' Association. It is of most simple construction, being composed of a fire-basket with vertical bars on each of its four sides, and built around with fire-bricks. A channel is, however, provided around the sides and back, through which the air circulates and becomes heated, and it is so constructed that it need not be allowed to go entirely out throughout the winter; as from its burning anthracite coal, a small quantity is sufficient when the fire is properly banked to keep it alight during the night. Apart from the object the inventor has in view, there are many purposes to which this grate may be adapted with advantage.

The 'Nautilus' Grate, which was described in the last number of the SANITARY RECORD, has already received an important improvement. This consists in attaching a chamber at the back, which is continued to the front point, and connecting it with the external atmosphere. The air thus admitted quickly becomes heated to a high temperature, and when it reaches the front or edge of the grate, is allowed to escape through a number of small perforations in a brass plate affixed to it. This arrangement has a double effect. A portion of this air mixes with the gases from the fuel, tending still further to minimise the production of smoke, while another portion will be diffused through the apartment, and so add to the warmth of the room.

One of the most recent additions to the Exhibition has been the 'Comet' Automatic Ventilating Grate of Mr. A. B. Verrier of Weymouth, manufactured for the patentee by Messrs. Morgan and Waide, Bath Works, Rotherham. This grate is not new, having been introduced some few years since, and Mr. Verrier has in his possession a host of testimonials in its favour from those who have it in use. The accompanying engravings show its appearance, which is that of an ordinary arched front register, and also the interior arrangements for ventilation and smoke consuming. The fire-basket projects well into the room, enabling the fire to be seen equally on all sides of the room. It is also very shallow from front to back, the latter being of fire-clay arched forward, which adds considerably to the radiating features of the grate. The fire is of the most cheerful character, combustion being slow, thorough, and the consumption of fuel small, the saving, according to the inventor's experience, being fully 50 per cent. over that of an ordinary grate of the same size. Over the fire-basket is a movable circular shaped hood or canopy, which can be raised or lowered by means of a thumb screw at the side. This, of course, tends to increase or diminish the draught and so raise or lower the bright appearance of the fire, and is one of the features that help the consumption of smoke, a leading attribute in the Comet grate. The grate has two draught actions, viz., one leading from fire, KK, into chimney proper, C, the other draught into heating apparatus, DD, through opening, E, in fire-brick back, FF. The heating apparatus is situated at the back of the fire-grate, K K, and is enclosed in an iron air-chamber, H H H, into which air is admitted through a pipe at the back of the air-chamber leading from the external atmosphere; the air thus admitted into air-chamber, passes over and around the enamelled gills, J J, of heating apparatus, D D, and thus becomes heated (not burnt); it then ascends and escapes into the room (in which the grate is fixed) through ventilators, L L, at the top of the grate; or if required it may be conveyed into an adjoining room or rooms through outlet, Q. The products of combustion have to pass through the chamber at the back of the fire, which quickly becomes in a highly heated state, and in connection with the hood, mainly consumes all

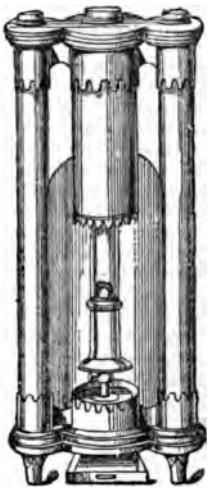
the smoke; this action being entirely automatic, removes the objection felt to grates where a mechanical action is brought into use. One novel feature in connection with the 'Comet' grate is that the external atmosphere is brought in from above, and not with the floor level, which is no doubt preferable, as this arrangement is calculated to give a supply of purer air. This, coupled with the withdrawal of the over-heated or foul air generated in the room, is controlled by the grate when in acti instance, when the fire burns briskly, the ingress air, and the exhaustion of the foul gases is great



vice versa, when the action of the fire diminishes, the inlet of fresh air and the outlet of heated maintaining an even temperature in the room and ing draughts. The 'Comet' grate is certainly attention of all sanitarians.

GAS APPLIANCES.

Patent Hygienic Condensing Gas Stove, 'The
is one of those that supply light, heat, and venti-
he same time, and the patentee was, we believe,
:rson to manufacture a heater of this kind. This
also be constructed to burn oil, to heat a range of
pipe, and is consequently admirably adapted for
e purposes, for which it may be used with perfect
s stoves, as a rule, require a chimney or other vent
f the products of combustion, but in this stove
ll condensed and rendered innocuous, an advan-
materially commends it, and removes that
o the majority of stoves heated by gas. Here
ie first place, are carried up from the light, which
nd burner, through the centre cylinder, giving off



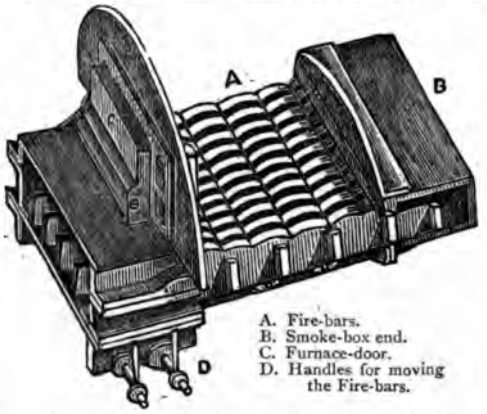
pass right and left down the side tubes into a
forming the base of the stove. This chamber,
ays cold, condenses the vapours, which run off as
ss liquid (containing sulphurous acid, etc.) into a
neath; the gaseous products are then drawn up
ibe, behind the centre one, by the syphon action of
right over the flame, whence the heat escapes
dry by an enclosed inner tube. Every portion of
except this inner centre tube, being hermetically
vapours can escape, as, if not condensed at 50°
:y are dried up at about 400° in the hot-box. It
hat three pints of liquid are obtained by burning
f gas in twenty to twenty-four hours, which liquid is
given off from every open gas burner in use. These
wever, are not intended for rapid heating, but to
n even warmth an hour or so after lighting. For
a temperature of 55° can be maintained in a bed-
feet by 12 feet the whole night through, if the
:ter outside falls to 35°, by burning 25 feet of gas
ne penny only) in ten hours, or if down to 25° out-
urning 50 feet of gas in the same time. Fresh air
awn from outside, and passed through the hot-box,
a proper system of ventilating tubes the impure
he ceiling can be burnt in the stove, and finally
side without loss of heat. Hot-water pipes and
iler can be attached, diffusing the warmth better,
ater can be drawn off hot in the morning, or con-
th the bath. Pure moist air, if wanted, is easily
by placing a vessel of water over the centre tube.
worthy of remark that the light given by these
greatly increased as compared with an ordinary
wing to the perfect combustion of the gas. They
in three sizes, to comfortably warm from 1,000 to
ic feet of air, and in a pillar form to light a hall
ie. They are also capable of a variety of other
ons in form, size, etc., and may be made of a
amental character, according to requirements,
and in proportion to the amount of heat generated they occupy but little space. A Company has been formed for the manufacture of these stoves, named 'The Hygienic Heating and Lighting Company, Limited', the offices being at 16, North Buildings, Finsbury Circus, E.C.

Amongst the gas engines exhibited is one, the 'Withers', by Messrs. Stark and Co., Torquay, which has attracted considerable attention, owing to the simplicity of its construction, and certain novel features introduced into its working arrangements. It is a direct acting vertical engine, and derives its power from the ignition and expansion of the gases in the cylinder, the power being applied at each up-stroke of the piston. On commencing its stroke, it draws into a chamber at the bottom part its charge of gases, and when it has made one-third of its stroke, the slide valve shuts off the supply, and brings a gas flame opposite the 'port' through which the gases have entered the cylinder, the result being the instantaneous ignition of the charge; the explosion converting it into an expansive force, which drives the piston upwards, imparting motion to the engine by means of an ordinary connecting rod and crank. Just before the piston arrives at the end of its stroke, it passes a 'port' in the cylinder that carries off any remaining force of the gases. There is considerable ingenuity displayed in the arrangement of the slide valve, both as regards the supply of gas and its connection with a cam for working it. This cam is of peculiar shape, and is employed instead of an eccentric, as it is considered to possess greater advantages, which may be described as follows:—On the first motion of the slide valve the ports are opened full way, and allowed to remain so for entrance of the charge, up to the instant of ignition, which allows a fuller or denser charge to enter, than could pass if the slide valve was in motion all the time, as it would then be cutting off the charge up to the time of explosion, and the igniting jet is brought opposite the cylinder port, allowing no time to elapse between completion of charging cylinder and igniting. After the explosion, and before the piston begins to descend, the valve moves out so as to open the air port again, admitting cold air at bottom of cylinder, while the hot air and expanded gases ascend and pass through a port, thus both cooling and purifying the interior of the cylinder. The remainder of travel of the slide valve causes the igniting jet to be brought opposite the standing jet, outside cylinder, and to remain stationary during one half its revolution, giving this time for relighting the slide jet, thereby increasing the certainty of action and steadiness of working to a very great extent. The practical mind will have observed from this description that owing to the shape of the cam, it provides three distinct workings to the slide valve, with the results mentioned. The engine exhibited is of four-man power, and burns only from twenty-five to thirty feet of gas per hour.

FURNACES, BOILERS, ETC.

The advantages offered by the use of Sawyer's Patent Furnace, with sliding bars, exhibited by Mr. C. J. Perceval, No. 19, Devereux Court, Temple, appear to be small consumption of fuel, a minimum of smoke, no clinkers or waste, whilst the bars appear to be extremely durable. The engraving represents the furnace door and bars. The latter, which are thin, being only three-quarter inch thick and three inches wide, from their peculiar form, allow a current of cool air to pass constantly over their surface area, and from this feature it is claimed that they last longer than any fire-bar yet constructed. The handle D, when set in motion, causes one half of the number to move in one direction and the others the reverse way, and this action can be alternated, which prevents any *scoriæ* or clinker collecting on them; as a proof of their durability it may be stated that a set laid down three years and a half since at the works of Messrs. Redpath and Paris, Lea Cut Iron Works, Limehouse, are said to be as good now as when first put in. The hollow chamber shown at the front of furnace through which the bars slide, also admits the air for cooling them, at the same time supplying the proper amount of oxygen to promote combustion, and by means of the smoke-box at the further

end it is nearly all consumed. To those acquainted with such appliances, an examination of Sawyer's furnace will,



A. Fire-bars.
B. Smoke-box end.
C. Furnace-door.
D. Handles for moving the Fire-bars.

we doubt not, cause satisfactory opinions to be formed. One other great advantage is, that it can be fixed at a smaller cost than any other patent furnace now in use.

THE SCIENCE OF BREAD MAKING.

In connection with the abatement of smoke, as regards bakers' ovens, an interesting paper was read at the Exhibition on Saturday last by Mr. Lawrence of St. Mary Axe, who has become known in connection with the manufacture of a patent refrigerator for brewers, etc., which he has recently introduced to the notice of bakers, for utilisation in the fermenting process. But it is not to the action of the refrigerator that we have to look for the abatement of smoke, this being advocated only as a part of a means to an end, viz., the scientific making of bread, and thereby producing a more palatable and more wholesome loaf. The minimising of smoke was shown in connection with a new externally heated oven, called the 'Chibnall' oven from the name of the inventor, a baker in the neighbourhood of Hammersmith. Hitherto, bakers as a body have been adverse to the use of externally heated ovens, owing, as the lecturer showed, to the difficulty of obtaining a good top heat. To illustrate how we cling to old notions, Mr. Lawrence mentioned that at the meeting held at Grosvenor House it was stated by some representative bakers that, if any alterations were made in the old internally heated oven, the public would have to be content with sour, heavy, unwholesome bread. 'Thus', said the reader, 'according to their showing, the Smoke Act must not be enforced in the case of the bakers, or an evil such as bad bread would be the result, and the interests of the bakers would be seriously damaged.' After describing the advantages of the 'Chibnall' oven, a model of which he exhibited, and which it appears is being taken up by the more intelligent men in the business, he proceeded to describe the various modes of making bread as generally adopted by bakers, and went on to say that the prejudice on the part of the trade against the external heating of ovens springs from the difficulty the baker experiences in preventing the bread rom turning out sour and heavy, a difficulty which arises from the fermenting, and not from the baking, process. He proceeded to quote from the opinions of Dr. Graham on bread making, his advocacy of *glucose* in preparing the ferment, which he said Mr. Chibnall has used with marked success. He then went on to point out the advantages of the refrigerator, which have been acknowledged by those bakers who have adopted this apparatus; and closed his remarks by again adverting to the 'Chibnall' oven, which he maintained, from its quick action of top heating, however good the fermenting and other stages may have been, would produce the best loaf.

HANSON'S SEWAGE PURIFICATION SYSTEM.

THIS all important question, on which so much thought, experiment, and capital, have been expended, has received most satisfactory treatment at the hands of Mr. John Hanson (John Hanson and Co.,) Sewage Engineers, Victoria Chemical Works, Wakefield. We have deferred adverting to this system before this, as we were anxious to be thoroughly satisfied as to its successful working; but as no doubt now exists that it effects its object in a thoroughly efficient manner, and at a remarkably small cost in working, we have much pleasure in calling the attention of Local Boards and Town Authorities generally to the invention.

There is, probably, no part of the kingdom where the sewage is (to use the words of one of the officials) of so vile a type, as in many of the manufacturing districts of Yorkshire and Lancashire, and it was in one of these neighbourhoods, viz., Tong, near Bradford, that Mr. Hanson erected one of his earliest sets of apparatus, where, according to the report of three successive chairmen of the Local Board, the most satisfactory results have been accomplished by their use, and each gentleman is emphatic in praise of the mode employed. According to official reports, the sewage of Tong is of the worst description, and to quote from Mr. Edward Croft, the present Chairman of the Tong Local Board, 'the refuse waters from the mills are thick with filth; sometimes the water is black, green, red, and in fact, all colours (the waste from the dye-houses), at other times the amount of soapy matter from the wool-scouring mills is abominable, not only to the sight, but to the smell. We consider that no water can be worse than Tong sewage, yet Mr. Hanson, with lime and black ash waste, produces a bright, clear, inodorous, and almost pure effluent, said to be the purest in the country.' Many other places in the Yorkshire district can also testify to the successful treatment of their sewage by this plan, and recently the authorities at Golcar have placed themselves in Mr. Hanson's hands, and early last month, new sewage precipitation works, erected under his supervision, and in connection with his patent, were formally opened. The entire *modus operandi* is of the most simple character, and has recently been made automatic in its action. The sewage, which is brought to the works by an ordinary duct, is carried into the engine house, where it flows into tanks. Into one of these lime is introduced, and into the other black ash waste, the principal ingredient of which is sulphate of calcium. This black ash waste is a bye-product from alkali works. Professor Roscoe says that from one-and-a-half to two tons of waste are formed for every ton of soda produced, and contains the whole of the sulphur burnt in the pyrites kiln, amounting to from 15 to 20 per cent. of the entire weight. Its purifying properties consist in the fact, that when brought into contact with lime, it reacts upon the latter, which is held in solution and precipitates both in the form of mono-sulphide and sulphate, carrying down with them all the sewage impurities. When the ash waste comes from the soda-making process it appears in the form of insoluble mono-sulphide of calcium. By exposure to the atmosphere, it passes into a higher state of oxidation, and is then called soluble di-sulphide of calcium, and in this state it is introduced into the tanks. Into the lime-tank water is introduced to produce the necessary paste, and is stirred by agitators, when it passes into the second cistern containing the ash waste, and which the sewage passes by gravitation. Here the precipitation before mentioned takes place, and the effluent issues in a clear and even sparkling condition, is carried into an open reservoir, from whence it is conducted into the land. The tanks are cleaned out as occasion requires, and the residuum is of value as an agricultural manure.

It is quite certain that fish will live in the effluent treated in this manner, and it is intended to demonstrate the fact by placing specimens of them in a tank containing purified water. It is, however, generally known that fish will not exist in sewage water treated by lime alone. Mr. Constable of the Tweed Commissioners, in a report connected with this process, says that salmon fry and the more delicate fish will live in one part of effluent to seven parts of river water. We may add that since the Otley works have been opened Mr. Hanson has improved considerably upon his invention, in so far that he has introduced the automatic and self-regulating machine,

ve, which supplies itself with the ingredients used, kept at work by the hydraulic action of the sewage thereby dispensing with the use of two cisterns, of gine, and workmen, and materially reducing the t working. Nothing can be much more simple he mode thus employed in purifying the worst flocculatter. For the work accomplished, the area of l space employed is remarkably small; the small cost apparatus is a still more extraordinary feature, and e ample and reliable testimony to show that its effects l that can be desired. We recommend all those ted in this question to put themselves in communicaith Mr. Hanson, or to visit the Tong or Golcar

PORTS OF MEDICAL OFFICERS OF HEALTH.

NSLEY.—For the past year Dr. Sadler reports a ate of 39.68, and a death-rate of 23.37 per 1000 of ation. The zymotic death-rate was 5.75, the total from this class of disease being no less than 167, han double the number reported in 1879. Diarrhœa esponsible for 88 deaths (more than half the total r). Dr. Sadler's view as to the probable causation of er diarrhœa being, that 'like many other diseases, it r its cause the admission into the human frame of e organisms which have the power of rapidly multi- when placed in favourable conditions; and there t be much doubt that these seeds are to a large extent in the secretions thrown off during the attack.' e deaths are reported from typhoid fever, or a re- n of the number of previous years, and Dr. Sadler nreasonably hopes that when the system of sewerage en completed, and the sewers thoroughly ventilated, aths from this disease will still further decrease. The ry condition of the town still remains unsatisfactory ne respects. The method of the disposal of refuse is y abominable, and Dr. Sadler recommends that for emedying of this defect one of Fryer's Destructors l be erected. The main-sewerage scheme approaches letion, 2,313 yards being constructed last year, but r ventilation of the old sewers is required. The e farm continues to act most satisfactorily, as far as urification of the sewage is concerned, the effluent pronounced by Dr. Attfield to approach in character very impure drinking-water.

MINGHAM.—During the second quarter of the pre- year there were 3,754 births and 1836 deaths in Bir- am, which, calculated upon a population of 402,296, rates of 35.8 and 18.25 per 1000 respectively. The ic death-rate shows an increase upon that for the quarter of the previous year, the rates being 2.1 and espectively. This mortality is more than accounted y the fatal prevalence of whooping-cough, which is ed with 93 deaths against 56 in the same quarter of Scarlet fever was fatal in 43 cases, and diarrhœa in small-pox at one time threatened to become epidemic, nergetic measures were adopted to prevent an antici- outbreak. A house to house visitation was made and setting forth the value of vaccination and revaccina- freely distributed. Eleven cases of the disease were ved to the borough hospital, where also 74 persons ing from scarlet fever and one from diphtheria were ved. The analyses made of the Corporation's water upon the whole, satisfactory, but the water supplied the surface wells was much contaminated with sewage ther impurities.

NCASTER, GOOLE, SELBY, AND TADCASTER.—This ination, which was formed in the autumn of 1879, ently works well, and Dr. Mitchell Wilson's report is very complete and satisfactory character. Special tion has been given to sanitary inspection, with gratifying results. In many places the water-supply has been materially improved, whilst in others arrangements are pending for proper or public supplies. In the Goole Rural District a company has been formed to supply part of the place with water, and for the Goole Urban District a Bill has been before Parliament having the same object. At Goole a considerable quantity of water has been wasted through defective fittings and the carelessness of householders. In the Tadcaster Rural District arrangements have been made with the Leeds Fever Hospital for the reception of all cases of infectious disease; but the Selby Rural District is still without hospital accommodation. Considerable and general improvement has been made in drainage arrangements; in the Selby Rural District additional drains are in course of construction, an improvement much needed at Goole, where fever was largely prevalent. In Goole, the hospital for infectious cases was of great value, 27 cases being admitted during the year, 22 of which were suffering from typhoid. The healthiest district was the Goole Rural, where the death-rate was 16.3 per 1,000, whilst in the adjacent Urban District was recorded the highest death-rate (20.7). In several of his reports Dr. Wilson draws attention to the application of bye-laws to Rural Districts, and remarks, 'without some additional means of controlling the erection of dwelling houses with some regard to sanitary requirement in Rural Districts, there will only be a repetition of past errors to be dealt with by the roundabout method of imperfectly improving what might have been altogether prevented.'

DRAYTON RURAL.—In his report for 1880 Dr. Sandford has to announce a higher zymotic death-rate than in 1879, this being occasioned chiefly by the fatal prevalence of whooping-cough, which caused 11 deaths. Diarrhœa was fatal in 9 cases, and enteric fever in 5. Phthisis occasioned 13 deaths, and cancer 10—this latter mortality being notably large. The general death-rate was 16.05 per 1000, against 17.22 in 1879. Dr. Sandford reports an increased water-supply, but complains of the illiberality of certain landlords in refusing to provide their tenants with an adequate supply within convenient and reasonable distance of their dwellings.

EXMOUTH.—Mr. Kempe reports that many minor improvements have been made in his district during 1880, the most important being the provision of a constant supply of good water. During the year many inspections were made, but little information is given of any results that may have followed thereon. House refuse is removed weekly; an arrangement which should be insisted upon, since in some parts of the town there is a tendency to overcrowding. The main sewers were examined and found in a satisfactory condition, and the sanitary authority has under consideration a scheme for sewering the lower parts of the town. During the year there were 183 births and 129 deaths, equal to rates of 30.1 and 21.2 per 1000 respectively. Zymotic diseases caused 19 deaths, measles alone being responsible for 15. Mr. Kempe's reports would bear expansion in the future.

GLASGOW.—The excessive cold in the month of January caused a very high death-rate amongst the inhabitants of this city, as it was 37.3 per 1,000 inhabitants per annum, against 30 for the preceding 10 years, and as many as 101 per 1,000 children living under five years of age, against an average of 93. In February, which was also excessively cold, being 5°.6 Fahr. below the mean of 10 years, the annual death-rate was nearly an average, being 28.3 against 28.4, and the deaths amongst children under five years of age were fewer than usual. It would appear from this that the first burst of cold weather had killed off all those most susceptible to its influence. The same has been observed in other localities, not only as regards unusual cold, but excessive heat. March and April were also cold, but the death-rate was below the average in both these months. May was warm, and June was cold, but both had a low death-rate. The annual death-rate for the March quarter was as high as 32 per 1,000, and for the June, 25, against 22.5 and 20.2 respectively for London. The increased

number of deaths in the first quarter was, as might have been expected, entirely due to pulmonary diseases. In the Bridgegate and Wynds the annual death-rate from all causes was 55.4 per 1,000, against 20.75 in two of the most healthy divisions of the city, whilst in the second quarter it was 40.5 in Bridgegate, and 17.42 in another division, showing a very greatly increased mortality amongst the poor, especially from the cold weather.

GLOUCESTERSHIRE. — Dr. Bond's report for 1880 is, as usual, excellent, interesting, and complete. He has, however, but little to report on the present occasion as to sanitary improvement. No new works of water-supply were carried out during the year, though improvements of a minor character have been effected in individual cases. The project of supplying Birdlip with water, which has been under discussion for some three or four years, has fallen through, and a similar scheme for another village has collapsed. Little or nothing has been done in the matter of sewerage. At Cirencester the drainage is still unfinished, but, at Cinderford, the sewerage system acts most satisfactorily. Complaints have been made of the offensive smells emitted from the sewers at Wickwar, which point to inefficient ventilation. The Rural Sanitary Authorities of Chepstow, Gloucester, Westbury-on-Severn, and Thornbury, now possess urban powers, and have adopted bye-laws for nuisance removal, whilst three have adopted the model building bye-laws issued by the central Board. The work of nuisance removal was fairly done on the whole, but overcrowding still exists, and, in Dr. Bond's language, 'is necessarily everlastingly growing up'. Alluding to the inspection of dairies and milk shops, the Health Officer regrets to report that no progress has been made in this respect. He states that 'two years and a half have elapsed since the Act was passed, and during that time abundant evidence has been accumulated that they may readily become active centres for the origination and propagation of epidemic disease, and still the Court of Quarter Sessions, which is the only authority that is empowered to undertake this work in rural districts, has obtained no knowledge of the conditions of a single dairy or milk shop in the county'. Dr. Bond rightly adds that such a state of things is greatly to be deplored. The general death-rate shows a decline, the rate for the past year being returned at 16.3 per 1,000, but the zymotic deaths show an increase as compared with the previous year, though they are considerably below the number in any of the preceding years since 1874. Diarrhœa was the most fatal and prevalent of these diseases, causing 64 deaths; measles caused 40 deaths; whooping-cough, 25; scarlatina, 24; and croup and diphtheria, 17. To diseases of the chest 353 deaths were attributed; whilst phthisis accounted for 189, and heart disease for 163. Dr. Bond devotes some attention to the subject of the compulsory notification of infectious disease, alluding to the recent deputation to the President of the Local Government Board as a sign that the country is now ripe for Parliamentary assistance in the matter.

PADDINGTON.—During last year, 2,841 births and 1,853 deaths were registered in this parish, but, excluding from the latter the deaths of 186 non-parishioners, the death-rate was 15.7 per 1,000. Of the total deaths, 420 were those of infants under one year, and 671 of children under five years of age, or 25.1 and 40.3 per cent. respectively of the total deaths. The rate of infantile mortality was 148 deaths to every 1,000 registered births, the magnitude of which was occasioned by the exceptional fatality of infantile diarrhœa. Of the total deaths from zymotic causes (228) one half were due to diarrhœa and whooping-cough, the former disease claiming 67 victims and the latter 49. To scarlet fever 40 deaths were registered. An epidemic of this disease occurring in the autumn of the year, was traced by Dr. Stevenson to the use of contaminated milk. Measles accounts for 41 deaths, fever for 16, and diphtheria for 15. No deaths from small-pox were reported. Pulmonary diseases (other than phthisis) caused 327 deaths, and tubercular diseases 206; while 121 deaths were attributed to wasting diseases of infants. There are fewer particulars as to the sanitary progress of the district than might have been desired; but Dr. Stevenson refers, as usual, to the question of the water-supply of the metropolis at some length.

HALSTEAD RURAL (1st Division).—For 1880 Mr. Hind reports a birth-rate of 24.13 and a death-rate of 16.35 per 1000, presumably based on the population of 1871. Scarlet fever was somewhat prevalent, but only one case terminated fatally, the source of infection being traced in most cases to the town of Halstead. A considerable number of cases of enteric fever occurred, and in 14 instances the cause was found to be polluted water. Ten cases of diphtheria, one of which terminated fatally, occurred in a single family, and it would have been interesting to have had from Mr. Hind fuller particulars as to the circumstances of this unparalleled house epidemic than the unsatisfactory statement that it was due to 'a defective sink in the back kitchen'. The water-supply of the district seems far from satisfactory, but a scheme is in preparation for affording a wholesome supply to a number of parishes. The want of bye-laws is much felt, but it is satisfactory to learn that the necessity of hospital accommodation has been appreciated by the local authority.

LEICESTER.—The greater part of Dr. Johnston's interesting and valuable report is necessarily occupied in dealing with the terrible diarrhœal mortality which periodically occurs in this borough. Not only was diarrhœa unusually prevalent, but measles and scarlet fever prevailed throughout the year in an epidemic form. The population at the middle of 1880 Dr. Johnston computes at 120,325, amongst which there were 2,969 deaths; a number in excess of 1878 by 469, and of 1879 by 318. Of the total deaths, 779 were from zymotic causes, representing a zymotic death-rate of 6.5 per 1,000. Diarrhœa was the most destructive, causing no fewer than 398 deaths, of which 275 were infants who had not completed their first year of existence. During August and September free distribution of diarrhœa mixture was resorted to, but with what success we are not told. The fever hospital maintained its prestige as a valuable means of isolation, no less than 283 patients being admitted. Measles were fatal in 166 cases, or an increase of 94 upon the number recorded in 1879, whilst 49 deaths are attributed to scarlet fever, 27 occurring in the fever hospital. The agency of schools was a most productive cause of the fatal spread of this disease. Fifty-one deaths were registered as due to typhoid, a mortality which Dr. Johnstone associates with impure water and foul air. The infantile mortality was excessive, no fewer than 1727 deaths occurring in children under five years of age, 1,070 being in infants who had not reached their first year. The sanitary work of the year is dismissed in a few lines, but Dr. Johnstone states that this work has been efficiently performed. Numerous notices were issued for the abatement of nuisances and for the amendment of existing defects.

LUTON RURAL.—This report only includes the [illegible] of 1880, and is apparently the first from Mr. Monk's pen. Having regard to these facts it would be unwise to expect a complete and lengthy report; but Mr. M[illegible] omits altogether the record of any inspections he may have made, and there is no mention of the population of the district. He states, however, that during the time he has been health officer there were 107 deaths. Scarlet fever was prevalent, causing 9 deaths, whilst diarrhœa was fatal in 13 cases, the latter mortality being due, in the officer's opinion, to improper feeding.

NEWTON ABBOT RURAL (Wolborough and Dawlish). Mr. Leonard Armstrong is to be congratulated upon the excellence of his report on this combination for the [illegible] year. Systematic inspections seem to have been thoroughly and frequently made and many improvements carried out, whilst the attention of the sanitary authorities has been drawn to the existence of conditions requiring their attention. In the Rural District many complaints were made as to the water-supply, which, upon examination, were found to be so impregnated with mineral salts as to render it unfit for drinking; but in other cases the defect lay with the people themselves. From one well, in nearly a cart-load of dirt, an iron cannon ball was brought up, which

elieved to have been there since the time of Crom-
A similar ball was found on draining a cesspool in
r part of the town. In the Rural District Urban
s have been granted to nine of the most populous
es, and amended bye-laws are now before the Central
. Many insanitary defects exist in the Wolborough
ct, where the water-supply is far from satisfactory.
awlish a new burial ground is to be made; and im-
nents have been made in the water-supply. The
rates of the component districts vary considerably,
ite at Wolborough being 16.03, in the rural district
and at Dawlish 22.9 per 1000. The latter mortality
ibuted chiefly to the epidemic prevalence of measles,
was very fatal also in other parts of the combined
Whooping-cough was also prevalent in the rural
t, but the other zymotic diseases caused only a very
aths.

IDERLAND.—The late Dr. Yeld presented, as was cus-
y with him, a full and interesting report of his proceed-
uring the year. He chronicled many improvements,
vance made in the system of excrement disposal being
the most notable. The sewerage extension is almost
nished, but there remain one or two large areas that
quire main drainage. The sanitary condition of the
ater-houses received careful attention, but no progress
en made towards building public abattoirs, though
vement is expected in this direction. The cow-byres
ilk shops were thoroughly inspected, and on the
ak of scarlatina near one of these establishments the
were at once isolated, so that the milk suffered no
nination. The birth- and death-rates were respectively
24.4 per 1,000; the latter being an increase of nearly
cent. upon the rate for 1879. The increase was due
prevalence of scarlet fever and to the exceptional
y of diarrhœa during the autumn months. A total of
eaths was registered from this latter disease, all of
, with the exception of 15, were those of children
5 years of age, and 112 of them of babies, who had
ached their first year. Irrespective of the meteoro-
l conditions, Dr. Yeld attributed much of this mor-
to improper feeding; and upon enquiring into the
of 112 infants from this malady, he found that ten
ad been nursed by the mother. Scarlatina was fatal
cases; measles in 99; and whooping-cough in 73.
ty-seven deaths are recorded as due to enteric fever,
e fatal prevalence of this disease is attributed to the
of the ground upon which the houses in the locality
d have been erected—the foundation of the houses
built principally upon colliery refuse.

THINGTON.—Dr. Railton prefaces his annual report
past year with a somewhat elaborate statement of
fective sanitary arrangements which exist in many
s in his district; and he makes a variety of useful
stions in the matter, elaborating his scheme with a
lly prepared lithograph. Whilst reporting a satis-
ily low death-rate of 13.7 per 1,000 (based upon a
ation of 15,000 souls), the Health Officer has to
a high rate of infant mortality. Of the total 205
, 90 were those of children under 5 years of age,
f these 45 had not reached their first year of exist-
The most productive causes of this mortality were
tal prevalence of bronchitis, pneumonia and pleurisy,
œa and scarlet fever, which together caused 32
s. Alluding to the deaths from diarrhœa and bron-
Dr. Railton states: 'Improper feeding of infants
largely account for the diarrhœa and other diseases
ied under the term of mal-nutrition, while insufficient
ng or exposure to the cold, will have a great deal to
th the deaths from bronchitis.' The fatal prevalence
rlet fever he thinks was due to the carelessness shown
rsons in charge of the patients, in allowing inter-
between the sick and infected, and to the absence of
of isolation of the smaller houses. During the year,
ses of diphtheria were reported, 9 of which termi-
fatally. Upon inspection, the sanitary arrangements
majority of these houses were found to be defective;
n some cases Dr. Railton thinks the infection was
d by the air. Sixteen cases of enteric fever were re-
ported, and in almost all the houses where the disease occurred, insanitary conditions were found to exist. The district appears to have been kept under constant inspection, and many improvements are reported, notably in the condition of the dwelling houses of the poorer classes. The drainage, however, is far from satisfactory, since it is stated that the streams perform the functions of main sewers.

WEDNESBURY.—Last year there was a slight increase in the birth-rate in the district, but the population increases slowly, under the present circumstances of bad trade and general commercial depression. Whilst Mr. Garman is able to congratulate his Authority upon the general decline of the 'fever' rate from 1.2 in 1874 to 0.50 in 1880, he has to announce an increased zymotic rate, in which scarlet fever and diarrhœa figure largely; the former being fatal in 48 cases, and the latter in 39. Alluding to the prevalence of the first disease, the Health Officer holds that whilst unrestricted intercourse between the healthy and infected continues, and until proper isolation exists, 'we shall have a continued existence of scarlet fever, and its allies, augmenting the mortality and promoting trouble and distress in families'. Diarrhœa was, as is usual with it, specially fatal to infants in the summer months. The deaths from pulmonary diseases show a decline, and there is a decrease in the number of deaths of infants from wasting and tubercular diseases. During the year the current sanitary work of the district was well attended to; many nuisances being abated, and the slaughter-houses, etc., systematically inspected. The information given on these points is, however, somewhat meagre, and would bear expansion.

REVIEWS.

Ozone in Nature. By J. MULVANY, M.D., R.N. (England).

DR. MULVANY records in this pamphlet some observations of his as to the atmospheric conditions most favourable to the formation of ozone. His first remark concerns *temperature*, and is to the effect that a high temperature does not diminish the quantity of ozone in the air. This of course is no more than we should expect, seeing that ozone is not converted into inactive oxygen till the temperature reaches 250°—300° C., a temperature never attained by the atmosphere of our earth.

In his observations on the influence of humidity, winds, and the area over which the winds have blown, upon the quantity of ozone present in the air, Dr. Mulvany appears to lay too much stress upon the influence of the presence or absence of *moisture* in the air. There is no evidence that evaporation produces ozone, except perhaps indirectly by causing electric excitement in the atmosphere, which, in its turn, may produce ozone. We know, for instance, that water in evaporating produces electrical excitement of the vessel containing it, and that we can produce ozone by the induced current from a Rühmkorff's coil; but we cannot produce ozone by evaporation. This, of course, in itself would be a poor argument as applied to the processes of nature, but it is of some weight when we remember that the air which has been wafted across a large extent of land has been exposed in its passage to numerous agents (putrefying organic matter, *e.g.*) which tend to destroy ozone, whilst that which has traversed a vast expanse of ocean has met with infinitely less ozone-consuming material in its passage; so that it seems at least as reasonable to attribute the excess or deficiency of ozone to the absence or presence of putrescible organic matter in the area over which the air has passed, as to put down such excess or deficiency to addition or abstraction of aqueous vapour from the air by that area. The fact, however, observed by Dr. Mulvany agrees with all recorded observations on this subject, however that fact may be explained by different experimenters, viz., that there is more ozone in air which has reached the observer across an expanse of ocean, than in that which has traversed a large surface of land.

The same kind of argument applies to Dr. Mulvany's remarks concerning the influence of *rain* and *altitude* upon the presence of ozone in the atmosphere. He says that ozone of the higher strata does not diffuse readily into the lower ones; and attributes the greater preponderance of ozone after heavy falls of rain to the mechanical effect of the rain-drops in carrying down ozone from the upper strata. But the larger quantity of ozone (which is heavier than oxygen) in the upper strata may be more simply accounted for by the absence in those lofty regions of ozone-consumers, whilst the increase of perceptible ozone in the atmosphere of the lower strata after heavy rain may be accounted for by the thorough *washing* undergone by the atmosphere, removing from it those gases and solid suspended particles which are incompatible with the presence of ozone.

In his remarks upon the genesis of ozone, Dr. Mulvany appears to attribute too much to the influence of the disruptive discharge of electricity, which is now generally acknowledged by physicists not to be a factor of ozone; whilst his explanation of the influence of clouds in producing ozone by the 'vehicular function of the rain-drops' appears far-fetched, and overlooks the influence of 'induced electricity', an undoubted ozone-factor, of which clouds are very frequently the seat. The gases 'appreciable to the olfactories' produced during a thunderstorm are now believed to be oxides of nitrogen. Moreover, these oxides of nitrogen affect the starch and iodide paper in the same way as ozone, and when present in small quantity have a similar odour. The only influence of ozone upon the human organism which Dr. Mulvany has been able to distinctly prove has been an increased activity of the generative organs. This is an interesting observation, as confirming the general view taken by sanitarians of the influence of this agent, viz., that it is health-giving and invigorating to the animal organism; it being taken as an axiom that any agent which tends to improve the well-being of the system at large, and especially one whose action appears to be chiefly apparent as a *nervine tonic*, will tend, *pari passu*, to increase the activity and efficiency of the reproductive functions.

Sanitary Science and Practice. An Illustrated Catalogue and Prospectus of the Sanitary Engineering and Ventilation Company, 115, Victoria Street, Westminster.

THIS work sets forth the objects of the Company, which are to furnish householders in town or country at stated charges with trustworthy advice upon the subject of house-drainage, and to undertake such sanitary work as their inspectors advise. The work is profusely illustrated, and valuable hints are given, by which pure air and water, and adequate light may be obtained.

Apart from the Company's own inventions, they illustrate a large number of sanitary and hygienic appliances of the most popular makers, all of which they supply according to requirement in any work they may be called upon to carry out. Not a room in the house has been forgotten, and the warming and ventilation of offices, the latter often difficult from their peculiar construction, have been well considered. To any householder suffering from imperfect drainage, ventilation, or difficulty of heating effectually, or to those building new houses, the Sanitary Engineering and Ventilation Company will prove valuable guides.

Stidder's Patent System of Sanitary Ventilation and Drainage for private and public buildings, and Stidder's Patent Sanitary Appliances, including water-closets, baths, lavatories, urinals, water-waste preventers, pumps, slop-closets, plumbers' and engineers' brass-work, etc., etc. By J. G. STIDDER and Co., Sanitary, Hydraulic, and Builders' Engineers, Southwark Bridge Road, London, S.E.

THIS is a complete and exhaustive work devoted to the various branches of practical sanitary apparatus, well got up and fully illustrated.

LAW REPORTS.

THE POWERS OF THE LOCAL GOVERNMENT B

This was an action to restrain the defendants, t Sanitary Authority of King's Norton, from proceed a certain scheme for sewage works which they wer ing to carry out under the provisions of the Publi Act, 1875. The plaintiff, Mr. Barker, was the an estate, which, it was stated, was likely to b great value as a building estate, and his ground of was that the defendants were exercising their Parli powers in bad faith, that they had no *bona fide* int carrying out any sewage works, but were, in tr cising their powers for the collateral purposes of temporary stop to the complaints of other landow of depreciating the value of the plaintiff's l diminishing the amount of compensation to be pa when any scheme for sewage works should really templated. The course of proceeding in such ca the Public Health Act, is for the Local Board or Authority to apply for a provisional order to t Government Board, and such provisional order, if m afterwards to be confirmed by Parliament by the Pr Orders Confirmation Act which is passed in every The defendants (who had demurred to the stat claim) urged that the action was substantially an restrain an application to Parliament, because the p was in effect a mere substitute for the proceedi private Act of Parliament, and that it was a well est rule that the Court would never restrain a public bo applying to Parliament, unless, perhaps, where doing involved an actual breach of contract.

Vice-Chanceller Hall held that the Local Gov Board was, under the provisions of the Public Heal the proper and competent tribunal to deal with the qu and that the action could not be entertained by the and his Lordship, therefore, allowed the demurrer.

THE SANITARY CONDITION OF DWELLING HOU

Brocas *v.* Priddy.

This was an action to recover damages for a representation as to the sanitary condition of a house at Norwood called Berkeley Lodge, brought maiden lady against another. The plaintiff took the in June 1877, at £110 a year for seven, fourteen, or t one years, but was forced to leave it in November la consequence of the offensive smells from the drains, flowed into a cesspool in the garden.

Mr. Baron Pollock, in his summing up to the ji marked that the present was a case of some consid importance. The questions involved, however, w of very great nicety. Questions had lately arisen how far the lessor of a house gave an implied warra soundness in a sanitary point of view to his lessee that was not in dispute now. Neither did any ques what was the contract between the parties arise; th defined by the lease, which could not be altered by evidence; and thereby the plaintiff was bound to ma the drains at Berkeley Lodge. If a question was ans falsely by a landlord in relation to a contract he wo liable, and if the tenant acted on it and suffered di he could recover. In Lord Cairns's words in 'The River Silver Mining Company *v.* Smith', 'if person upon themselves to make assertions as to which th ignorant whether they are true or untrue, they ma a civil point of view, be held as responsible as if th asserted that which they knew to be untrue. Upo part of the case I apprehend there is no doubt.' Th misrepresentation must be material, made and unde by the maker and the person to whom it was ma bearing on the substantial matter of the contrac must be made dishonestly—he did not use the wor

moral sense, but false to the knowledge of the person making it. If a person honestly believed what he said, though it was utterly false and incorrect, no action would lie. The tenant might send a surveyor to examine the premises, and act on his report. If the defendant asserted the fact as if she knew it on a substantial matter in such a manner that she supposed the plaintiff would act on it, then she would be liable. It was to be observed that the conversation took place, not between persons of business habits, but people who, so to speak, talked loosely. Also, the 'mad dog' cry of 'bad drains', and the pious horror everybody had of them gave people a tendency to exaggerate, and that the jury should not overlook. Was the representation alleged made in fact by the defendant? If a false representation was made, was it false to the knowledge of the defendant; or, being false, was it made by the defendant on no sufficient grounds? The plaintiff said the defendant told her the house was 'as well drained as any house in Norwood', and the defendant did not swear point blank in contradiction, but said that to the best of her recollection no such conversation took place—not as the plaintiff asserted. The fraud ought to be proved clearly and fairly established before the jury found a verdict for the plaintiff. Thirdly, did damage result to the plaintiff by reason of the false representation of the defendant? The house was built long before the Main Drainage Act, and it was a strong observation on the defendant's part that the doctor did not seem to have called attention to the smells for at least three years, though he said he thought they might have caused the illnesses which he attended.

The jury were discharged by his Lordship, the foreman intimating there was not the slightest chance of their agreeing on a verdict.

Charges for Water-Supply to Baths.

At Sheffield, the stipendiary magistrate has had before him a case of much importance to water consumers. Mr. W. R. Carter, of that town, summoned the Sheffield Waterworks Company for refusing to supply him with water. He has a fixed bath in his house, and according to the company's scale he is required to pay 25s. a quarter for the supply to this bath, in addition to the sum he pays for ordinary domestic purposes. Regarding the charge as excessive, he has refused for many years, along with the majority of bath holders in the town, to pay according to the scale, contending that the consumption of water for private house baths was included in the domestic supply. Recently the Master of the Rolls decided, in the case of Mr. Bingham, the Master Cutler of Sheffield, that the company had no power to enforce their estimate scale, but that payment should be according to the company's Act of Parliament, namely, 10d. per 1,000 gallons. The company then insisted that consumers should, at their own expense, fix meters to ascertain the consumption. Mr. Carter holds that the company have no power to require consumers to fix meters, and has declined this mode of measurement. In August his domestic water-supply was cut off, and for four months he was without water. He therefore brought this action against the company, claiming penalties to a large amount for the company's refusal to supply. The defence was that the consumers must have the bath supply separate from the domestic supply, and that the former must be paid for according to measurement, or by agreement with the company. Mr. Carter declined to make a satisfactory agreement, and as he continued the use of his bath without fixing a meter, the company deemed themselves entitled to disconnect the supply. The stipendiary, after taking time to consider his decision, has ruled that no Act of Parliament compels the use of meters, and has inflicted penalties on the company, and given Mr. Carter his costs. The company have given notice of appeal. This decision is one of very considerable importance, inasmuch as it affects the water companies and water authorities all over the country.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE BIRMINGHAM SANITARY OFFICERS' ASSOCIATION.

With reference to the letters appearing in your last two numbers, signed 'Cui Bono' and 'Sanitary Inspector', I take this opportunity of stating, for the information of Sanitary Officers generally, that we have already a Sanitary Officers' Association in Birmingham, and that, amongst the objects of the Association, tenure of office and superannuation are energetically taken up and discussed. We shall be pleased for every Inspector of Nuisances to join us, and thus help in this matter, as in unity there is strength. The annual subscription is but 2s. 6d. If any officer is entitled to superannuation it is the Nuisance Inspector, as everyone must know his dangerous contact with disease, let alone the risk of conveying infection to his own offspring.

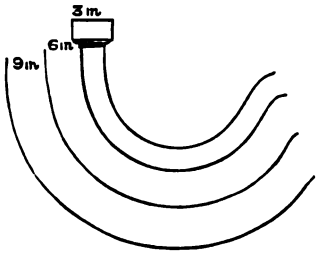
All information concerning the Association can be obtained on application to Mr. Thomas H. Dale, C.S.I., Secretary, Winson Green Road, Birmingham.

Noah Deeks, President,
and Inspector of Nuisances for Aston Poor-Law Union Rural Sanitary Authority.

Birmingham, 13th February 1882.

STONE-WARE TRAPS.

I wish to be informed if it is a fact that makers of traps in sanitary stone-ware increase the bend correspondingly with the size of the pipe; or are the bends the same for all the sizes of the pipes, thus?



If so, it strikes me it is a great mistake, as the bend should not be so increased, but rather diminished; as the difficulty of washing out the syphon of its contents is, consequently, likely to become greater, making it a deposit for sewage.

P. Hinckes Bird.

CLOSE *versus* OPEN STOVES.

Our minds having been directed very much of late to the subject of heating our houses effectually with the smallest amount of money, dirt, heat, and smoke, I was attracted by an article in *Knowledge*, on 'Stove-Heated Houses'. I do not presume to dispute Dr. Siemens' scientific knowledge, but I cannot think that the antiquated fashion still adhered to in England, of endeavouring to heat our rooms by open grate-fires is conducive to health, and it certainly is not to comfort. The prejudice in our country against stove-heating must have arisen in consequence of using ill-constructed stoves; I have passed eight years of my life in Canada, during which time I used for six full months, and sometimes more, of each year, a coal-stove in my house, and never was so free from colds, neuralgia, and rheumatism, as while in Canada. I must, however, add, that the stove I used was a base burner of American manufacture, which is so constructed, that the heat is diffused from under the stove, hence its name of base burner. The heat does not come from the body of iron as in most stoves I have

observed in use in England. A stove constructed on the same principles I saw on exhibition at Kensington; indeed, I believe the Crown Jewel Base-Burning Stove there exhibited is precisely the same stove that I am now burning, and had sent over to me from the Detroit Stove Works. I can keep my house at any temperature I please, varying from 50° to 75°. I generally have it at 60°, and find no inconvenience from dryness of air which we sometimes do in the dry climate of Canada, and therefore rectify the evil by keeping a vessel of water on the stove, sending its vapour through the rooms; but here, especially of late, I have found no occasion to create artificial damp, for that in the air outside would have supplied far more than enough but for the drying powers of my base-burning stove. Can it be healthy, I ask, to sit close to a roasting fire, just under a wide gaping chimney: one side of the body nearly scorching while the other side is freezing from the cold air attracted by the chimney. Surely we should aim at an equal temperature indoors, and that, the stove affords us. Why is it that many persons are annually sent out to Canada, suffering from consumption contracted in this country? Is it not because out-of-doors they enjoy a dry bracing air, and in-doors they live in a dry house of equal temperature throughout.

Dr. Siemens endeavours to make good his objection to stove-heating, by citing the American as a spare lank specimen of humanity. True, he is so, but may not the ever busy brain and active go-ahead life the American leads, do more to render him spare than the stove-heat can, as he is seldom consumptive, or a martyr to neuralgia, or a rheumatic cripple; but turn where we will, we see the produce of the American's inventive brain. Does John Bull's rotundity do as much for himself and the world as the lank brother Jonathan's brain does? Whatever evils arise (if any) from the dryness of stove-heating in America, our English climate will help us out of this difficulty, and make our homes comfortable, if only we could bring ourselves to resign our household-god, the blazing fire roaring up our chimney. I, at least, have done so, and am truly thankful now the parting is over, for I live in comfort. I have warmth without soot and dirt, and yet through the talc windows of my stove, I am cheered by the sight of a bright red-hot glow.

ONE WHO STUDIES HEALTH AND COMFORT.

A PARK FOR PADDINGTON.

An employer of labour in the East End of London has just set an example which, I trust, will be widely followed throughout the Metropolis. Mr. Wilberforce Bryant, of the firm of Bryant and May, has generously authorised me to promise £100, as a contribution from 'An East End Employer', towards the fund for creating a Park for Paddington. This sum is offered on the large-minded principle that the provision of public parks, wherever there is proved necessity for their existence, should be made by the aid of all sections of the population of this great city, regardless of narrow considerations of mere locality.

Will not other distant residents as generously help the Paddington Committee in the gallant struggle which they are making for a noble object?

FRANCIS GEORGE HEATH.

Brunswick Lodge, South Hackney.

DR. B. W. RICHARDSON ON THE 'SEED-TIME OF HEALTH'.

Dr. Richardson's paper in your January issue is certainly a most suggestive and soul-stirring one. His assertion, that he had 'never seen a healthy child', is rather startling; but the great point is:—Is the statement true? Another important assertion made is, that 'we have no shame when our young fail and die'. Now it is to be feared this is only too true, and the want of this 'shame' prevents improvement. Grief is all very good, but it is generally a mere blowing off of the steam. No good practical result comes from it, while many, instead of acknowledging their faults, lay the blame upon 'Providence'. The child's time to die had come, and had it not been poisoned by diphtheria, or scarlet fever, etc., it was bound to have either shot itself or to have fallen down and broken its neck. And so with an imaginary meek, and mayhap lazy, resignation to the will of Providence, action is excused. It is high time that such absurd ideas were exposed. Providence did not allow children to be made for the purpose of cutting off a number of them in infancy; no, Providence intended all to become men and women, only something human often intervenes to prevent the plan being carried out. It is for this human failure or fault that we should feel shame, and so feeling we should all strive after improvement.

In the city we have pulmonary diseases in excess, but on leaving the city for the country, we are often out of the frying-pan into the fire by landing in the midst of a hotbed of some of the filth diseases, and not unfrequently the nearer the church the nearer the midden. The care of the body as a duty, not only for the sake of self, but also for the sake of the community and of posterity, is too much overlooked. In a roundabout way, we offer up far more human sacrifices to Moloch in our christian country in this nineteenth century, A.D., than were ever offered in the old style three thousand years ago. Our preventible disease and death-rates prove this, and the sooner each one in his own sphere does what he can to bring on a better state of matters, so much the more honourable and better will it be for us as statesmen, as a nation, and as parents.

EXCELSIOR.

CONTAMINATION OF FOOD.

The contamination of food in its passage from the seller to the consumer is a matter calling for far more attention than it gets. And in this connection, I would refer to the dangerous practice of people who sell food, living with their family at the back of the shop, and in full or open communication therewith. In such cases, a parent may be dispensing food to a customer the one minute; the next attending to some of the children who may be unwell—perhaps an attack of typhoid, diphtheria, or scarlet fever coming on—and before the child can be properly left, a rap comes to the counter for a new customer to be served, who, especially if he or she has hurried the shopkeeper, gets in the shape of disease-poison, something that was not wanted. In such shops, it is no uncommon thing too, for the children to handle articles of food with dirty hands, both when the shop is open, and perhaps more, after it is shut, and so disease germs may be deposited upon the food. Such shops ought, therefore, to be suppressed, and cleanliness, especially of the hands of all who pass articles of food through their hands ought to be insisted upon, and its neglect by said parties made punishable by law.

W. P. BUCHAN.

SANITARY INVENTIONS.

SPONG'S PATENT PORTABLE FIRE EXTINGUISHER.

The necessity for a good and simple portable fire extinguisher needs no argument in its favour. In country districts, where as a rule the nearest fire brigade establishment is a long distance off, and the appliances at hand for the purpose are probably inefficient or entirely absent, the advantages of such an apparatus are manifest; while for towns and cities, where a fire if not quickly got under control is but too often attended with the most disastrous results; the advantage of keeping a ready means at hand, that shall always be available in case of emergency is very manifest. We have had such appliances at our command for many years, but they have, unfortunately, not been made use of to a tithe of the extent suggested by prudence. Even with the means of extinction already available, statistics prove that a large percentage of the fires that occur, are extinguished without the aid of the fire brigade. That is, however, no reason for showing indifference to

safety, and it is probable that if these appliances were kept in every place of business, and in the majority of private dwellings, the risk to life from fires would be greatly reduced. Such an apparatus should clearly be of the most simple character, and at all times ready for use. In the fire-extinguisher constructed by Mr. Spong of 249, High Holborn, nothing but water is used, so there is no difficulty in keeping the engine always charged for use. The appended engraving shows its outward appearance. It is composed of a tinned iron cylinder, and suspended from the top is a tube a few inches long, through which it is charged with the water, which, reaching the level of the bottom of the tube is prevented from rising higher by the imprisoned air above. Attached to the engine on the outside is an air-pump, by means of which, and a tube extending from

bottom to top on the inside, the atmosphere in the air chamber is compressed to a pressure of 100 lbs. on the square inch, which is indicated by the guage shown on the top. When required for use, it is slung on the back by means of the straps, the tap in connection with the hose-pipe turned on, and the powerful stream of water directed upon the fire. The enormous force with which the water is discharged literally exterminating it. The pressure necessarily diminishes as the water escapes, but even the last pint is ejected at about 20 lbs. pressure ; and it has been practically proved that only about one-third of the contents (six gallons) is required to extinguish a fire of moderate proportions, if taken in hand in its early stage, which is the object of having an apparatus of this nature at command. All of these engines are tested to a pressure of 120 lbs., so that an ample margin for safety is provided. There is no other expense beyond the first cost of the apparatus, and scarcely any limit can be put to the length of time it will last. Several experiments have been made with Mr. Spong's Fire Extinguisher, under circumstances that would scarcely occur in the ordinary course of things, in which it has aided most satisfactorily. Recently at Balham, a fire composed of ten gallons of tar, set on fire by means of petroleum and shavings, when well alight, was extinguished in five seconds. A second, consisting of five tar barrels, several large wooden boxes and timber, with petroleum and shavings, was allowed to attain a full blaze throughout the materials, and was extinguished in twenty-five seconds ; and a third experiment with similar inflammable materials, but in which the flames were admitted to take still more secure hold of them, succumbed to the charge from the pneumatic extinguisher in twenty-eight seconds ; eight gallons of water only were expended on the whole of the fires. We are informed that Captain Shaw, the Superintendent of the London Fire Brigade, has expressed a decided opinion in favour of this fire-extinguisher.

TRICYCLES.

In continuation of the remarks upon Tricycles in the last number of the SANITARY RECORD, the 'Salvo', made by Messrs. Starley Brothers, St. John's Works, Fleet St., Coventry, may be pointed out as being one of the most popular machines of the day. Both Her Majesty and the Princess Beatrice have honoured the makers with an order for one, and we understand that these Royal personages have expressed themselves highly gratified with the machines sent to them. The pattern supplied for their use, and which for the sake of distinction we will call the 'Royal Salvo', is much more graceful in appearance than the previous one made by the firm. It is made in two widths, viz., 3 ft. 1½ in., or 3 ft. 3½ in., the larger one being recommended where the extra space required for it is not an object. The side, or driving wheels, are made fifty inches in diameter for gentlemen, and forty-six inches for ladies, the front wheel being eighteen inches, and a small safety wheel is added at the back, preventing all possibility of a back fall. Nearly the whole of the weight is borne by the two side wheels, sufficient only being laid on the front one to serve for steering purposes. Both side wheels are drivers. This motion is obtained by a simple contrivance, consisting of a small bevelled cogged wheel working against one of larger dimensions, and in combination with this arrangement is a patent transmitting balance gear, so arranged as to impart the exact amount of power required by each driving wheel, this being one of the special features of this machine. The arrangements we have described adapt it admirably for uphill work, and it is claimed that mounting steep inclines is effected with

half the labour required in ordinary machines, and the brake power is sufficient to bring it to a stand almost momentarily. All the other details connected with the apparatus are of the best description, such as roller bearings to driving wheels, patent adjustable ball bearings to steering wheel, also a patent improved pedal, an improved spring to the seat, the latter being adjustible, according to the height of the rider, in fact everything necessary to conduce to the comfort and safety of the rider appears to have been well thought out. Considering the several points of excellence enumerated, the 'Royal Salvo' is sold at very moderate price.

A BRONCHITIS STOVE.

Mr. Constantine of Fleet Street, well known in connection with his popular invention of the 'Treasure' Range, is also the maker of another 'treasure' in the form of a small open bronchitis fire-stove. This stove, of which we append illustrations, is made in seven sizes, is of neat appearance, and enamelled all over with a black glaze,

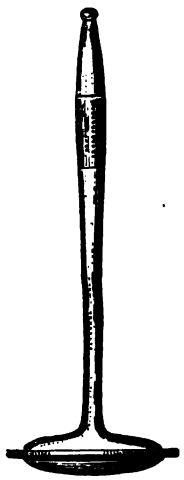
giving it the appearance of earthenware, thus not only saving all black leading with its consequent dust, but always being clean to the touch. It is intended to stand in the front of an ordinary fire-place, an ordinary smoke pipe carrying the products to the chimney. By this means all

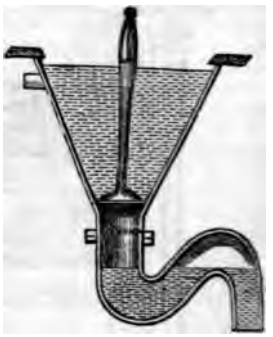
the heat is given off into the room, instead of being partly carried up the chimney, and a much smaller quantity of fuel is required. It will be observed that the top of the stove is fitted with a hinged lid, having a good-sized chamber inside. Into this space, a vessel specially made for the purpose, filled with water, is placed, the lid is put

down, the liquid soon becomes heated, and emits its vapour into the apartment, and there is less trouble in refilling it from time to time than with a kettle, independent of other objections to that method. These stoves are very cheap, and to those who study comfort as well as economy, either in sickness or at any other time (for the stoves are applicable for all occasions), they have strong claims to adoption.

A FLUSHING PLUG FOR WATER-CLOSETS.

The appended engravings represent a very simple and effective appliance manufactured by Messrs. Harrison and Wood, 105, Cannon Street, E.C., for thoroughly flushing ordinary water-closets, the one represents the article itself, the other shows it in use in a common closet basin and trap. The *modus operandi* is as follows:—Upon lifting the handle the plug is inserted in the basin, where by means of an india-rubber flange it fits tightly at the entrance to the trap, allowing the basin to be completely filled; it should then be withdrawn, when the whole body of water





thus released thoroughly cleanses the trap and pipes in the least objectionable manner. It is obvious that pipes will be more efficiently flushed and cleansed of any noxious matters, by introducing a volume of water in this way, than by passing ten times the quantity in the usual dribbling fashion; while the effect that would be produced by a number of persons in one street simultaneously adopting this plan must be very beneficial. The price of this article is so trifling, as to bring it within the means of all.

THE WOOLLEN-CLOTHING CURE.

IN the January issue of his journal (the *Monatsblatt* of Stuttgart), Dr. Jäger gives some interesting details as to certain erroneous methods of employing the woollen cure, of which he is so warm an advocate. Like every other therapeutic system, its effect depends on the carrying out in their entirety of certain rules; the partial application of which not only militates against the efficacy of the process, but causes to a certain extent a reversal of its salutary operation.

The counsels which Dr. Jäger gives in the remarks before us, deal especially with the danger of supplementing the whole regimen by baths. He even recommends the discontinuance of their usual practice, by those who seek the benefit of the new system, and who have been accustomed to a regular system of baths. He quotes the case of a lady who injudiciously took a course of baths while under the wool treatment and afterwards died.* He likewise gives an instance of a young man fond of athletic exercises, who continued to take cold baths while carrying out the prescriptions of the wool system. For a time no ill results ensued, but one day, after his bath, he was seized with a violent rheumatic attack. Dr. Jäger explains that the cure

* In a subsequent passage Dr. Jäger admits that the lady had an organic disease which caused her death, but he considers the bath had a bad effect.

of two powerful methods of bringing the blood to ce of the body produced inaction of the kidneys. sequent accumulation in the system of substances ould in the natural course have been carried off, according to his theory, rheumatic gout. He also the case of an English lady who had recently been a rheumatic affection by wearing wool, but who ied of her increased susceptibility to bronchial i. On inquiry Dr. Jäger found that the patient i accustomed to daily cold ablutions, and had con- his practice during the application of the wool t.

rther explains that the fluids in the human system ived by three organs, the skin, the lungs, and the These organs stand in vicarious relations to each he excessive activity of one inducing a proportion- ation in the action of the others, and *vice versa.* nbination of cold baths with the wool regimen i the sudorific activity of the skin, and relaxes the f the kidneys or of the lungs. Rheumatism is i the one case, and weakness of the lungs in the

itionale of baths is the development of the activity kin in those parts of the body which, from being stand in need of a stimulant not required by the ands. The action of wool clothing is, according Jäger, of a precisely similar tendency. Hence the on of a dual stimulating medium is deprecated by ravelling into the animal kingdom for further f this theory, he quotes the cat as being the hardiest t susceptible to infection of any domestic animal, that a course of cold baths would lead to pussy's issolution.

ystem itself, according to the correspondence pub- i the Journal named, consists in the adoption of the sole material for all articles of clothing which contact with the skin, and, as far as possible, for the earing apparel of both sexes. Other features of em are the keeping open of bedroom windows at id the exclusive use of wool or horsehair for stuffing es. The manufacture of this normal bedding (as ed) seems, according to the details published, to quired a certain amount of importance in Germany. eutonic expressiveness, the opponents of the system gnated *Falsh-bekleideten*, or 'wrongly-clothed per-

STRATED SANITARY PATENTS.

(1881.) WATER-WASTE PREVENTERS: W. OLOMEW, LAMBETH (Doulton's Works). [6d.]—is a vertical section of a water-waste preventer, for use to supply a water-closet. *a*, *a*, is a measur- rn of a capacity adapted to the discharge which it d to obtain; *b* is the ball cock by which the cistern ed; *c* is an overflow pipe to carry off leakage in ball cock should get out of order; *d* is the funnel f the delivery pipe; it stands above the high water the cistern; *e* is a lifting bell covering the funnel *d*;

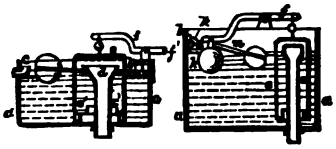


FIG. 1. FIG. 2.

pended from a lever *f*. By a wire connected at f^1 r is caused to lift the bell to set the apparatus in The bell being raised carries up the water with it on until it overflows the funnel *d*, and the flow ne delivery pipe sets up the syphon-like action, npties the cistern *a*. The bell *e* is flanged inwards is to contract its mouth; it is thus rendered more to carry the water up with it in rising. The flange e^1 also retains a certain amount of water, which when the cistern is empty serves as a weight, and aids in bringing the bell down. Fig. 2 shows the apparatus in a form suited for flushing drains. The measuring cistern *a* is supplied by a slow continuous flow by a tap or otherwise. Meanwhile, the bell *e* remains down, the weighted end of the lever *f* being supported by a finger, *k*, upon an axis, k^1. The axis, k^1, carries a pinion or toothed arc gearing into a similar pinion or arc upon the axis, *l*; *m* is a ball lever, also fixed to the axis, *l*. The ball floats up with the rise of the water, and, by turning, the pair of axes gradually depresses the finger, *k*, until the end of the lever *f* slips off from it. The weight then raises the bell, the syphon-like action is established, and the drain is effectually flushed by the sudden discharge. The finger, *k*, is jointed, so that it offers no impediment to the end of the lever *f*, passing to its upper side, which it does immediately, for the suction at once depresses the bell, and the outflow of water causes the finger to rise.

2281. (1881.) IMPROVEMENTS IN VENTILATORS: J. E. ELLISON and H. FOURNESS, LEEDS. [4d.]—The object of this invention is to admit air into buildings, carriages, and other structures, in such a manner as to effectually disperse it, prevent draught, and readily admit of the closing of the ventilator when desired. This object

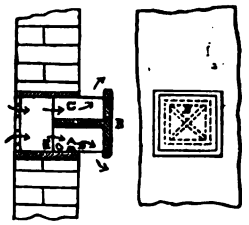


FIG. 1 FIG. 2

is attained by forming on the back of a plate of wood, metal, glass, or other substance, vanes or divisions placed crossways or radiating from the centre, which divisions slide in the corners of an angular box let into the wall, door, partition, or window. Where more convenient, the centre of the divisions may be cut away, or rods may be fixed on the back of the front-plate, so arranged as to slide or fit in the corners or grooves of the box. Suitable stops are provided to prevent the front part from being drawn straight out. The drawing annexed shows a ventilator constructed according to this invention. Fig. 1 is a vertical section of the ventilator; fig. 2 a front view.

2406. (1881.) VENTILATORS, ETC.: W. CHRYSTAL, LONDON. [6d.]—This invention relates to an improved

FIG. 1

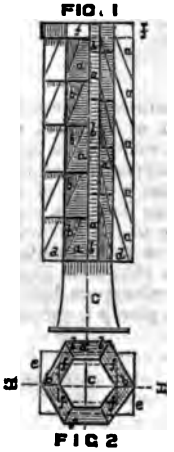


FIG 2

apparatus, chiefly designed to serve as a chimney top, but which may be used for ventilating dwelling-houses

and other buildings. The apparatus is constructed with a vertical tube, which may be placed on an ordinary chimney, or with a lateral branch to connect with the pipe of a gas or other stove. Fig. 1 is an elevation of the improved chimney top or ventilator half in section on line *x*, *x*, Fig. 2, which is a plan view of the same. This improved chimney top or ventilator is constructed preferably of sheet metal plates, united by rivetting. It may be of hexagonal or other figure in plan, and is constructed of as many series of upwardly inclined deflecting plates, *a*, as the chimney top has sides, arranged around a central thoroughfare *c*, the plates of each series being set one above the other at a short distance apart, and fixed between and to upright ribs or plates *b*, located at the angles of the polygonal figure, and set edgewise to the central thoroughfare *c*, which is about the same size as the chimney or shaft on which the ventilator is to be placed. These upright ribs *b* rise from a plate *d* fixed upon a short tubular foot *e*, which is fixed on the chimney or shaft in the usual way, and the ribs *b* are braced together by the inclined deflectors *a*, and also by a band *f* at top, the whole forming a rigid structure, presenting on all sides upwardly directed passages leading into the central shaft through which the wind enters.

2539. (1881.) VENTILATORS, ETC.: M. DELMARD, PLUMSTEAD, KENT. [6d.]—This invention relates to improved apparatus, comprising a chimney top, and a ventilator for dwelling-houses and other buildings. The said invention is illustrated in the accompanying drawings, in which Fig. 1 is an elevation, partly in section, of the improved chimney cowl and ventilating apparatus. Fig. 2 is a vertical section of the lower in-door portion of the ventilating apparatus. Fig. 3 is a vertical section of the burner of the said ventilating apparatus. In adapting this

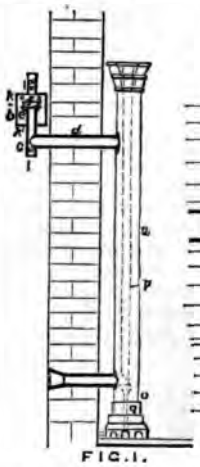


FIG. 1.

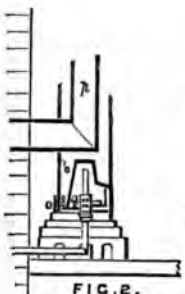


FIG. 2.

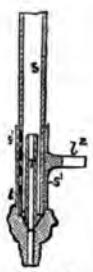
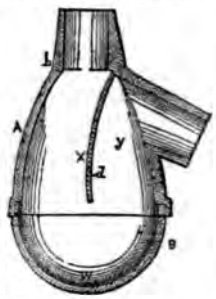


FIG. 3

invention to the purposes of ventilation, the cowl may be placed in any part of the roof, or on a pipe extending through one of the walls of the building to the indoor part of the ventilating apparatus, as shown in Fig. 1. This ventilating apparatus consists of the gas-stove *o*, through which passes the pipe *p*. This pipe extends at its lower end to the outside of the building, and at its upper end opens into the room to be ventilated. In the stove, and below the pipe, as shown in Figs. 1 and 2, he places a burner *q*. The annular space between the outer casing of the stove *o* and the pipe *p* is supplied through apertures *o** at the bottom of the stove with air from the room or apartment, and communicates through the branch pipe *d* with the vertical pipe *c*, but has not any outlet at the top of the stove, or any communication with the interior of the pipe *p*. It will be obvious that when the burner *q* is lighted it will warm the air in the said annular space, and cause an upward draught through the said space, which will draw the vitiated air from the room and expel it through the cowl *b*. At the same time, the air within the pipe *p* will be heated and ascend into the room, taking with it a plentiful supply of fresh air, which may be as desired by regulating the said burner. At the of the stove *o* he arranges a cone o^3, which, wl draught of air occurs, causes such air to pa openings at o^2, and protects the burner *q*, so as the extinguishing of the gas. He prefers to us constructed as shown in Figs. 3 and 4. This b gas inlet piece *r*, which is enclosed within the tu portion of the latter immediately surrounding th piece is perforated with a series of holes s^1. portion of the tube *s* is fitted a short tube or sle perforated with a series of holes t^1.

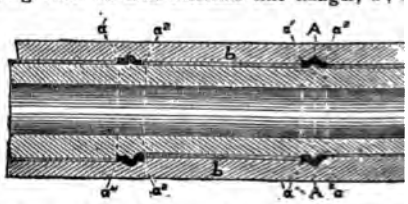
AMERICAN PATENTS.

246,453. TRAP: LUDWIG BRANDEIS, Br N.Y., assignor to Leopold Brandeis, same plac May 31, 1881. Issued Aug. 30, 1881.—*Clai* bottle-trap in two sections, the upper consistir body A, neck *b*, branch *c*, and partition *d*, form



the body, the gradually-contracting spaces *x y*, on sides. 2. The combination, in a trap, of the piece B, and the body A, having a neck and bra the partition *d*, the body at each side diverging f partition forming spaces *x y*, each widest at th portion. 3. A trap composed of separate parts, th provided with a removable cup *w*.

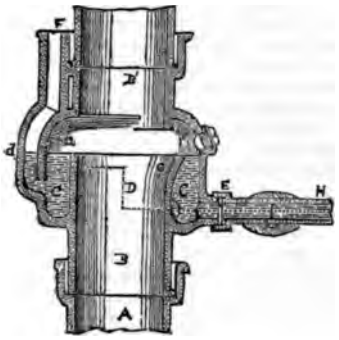
246,597. SHEET METAL AND CONCRETE P DRAINS: MORTIMER M. CAMP, NEW HAVEN, NEW YORK, N.Y. Filed July 11, 1881.—*Claim*- sectional sheet metal pipe, having overlapping jo riveted together, and which joints are afterward so as to form the outwardly projecting beads A, lapping external and internal flat flanges, a^1,



scribed. 2. In a sheet metal pipe for lining an with cement, asphalt, or similar substances, th beaded joint A, having external flat flanges a^1, an flat flanges a^2, as described. 3. In a jointed sheet metal pipe, the strengthening double meta formed by beading the overlapping ends of th sectional joints, in combination with overlaying and internal flat flanges, all made from the bod main tube, without any additional pieces, as and purpose intended, and substantially as described.

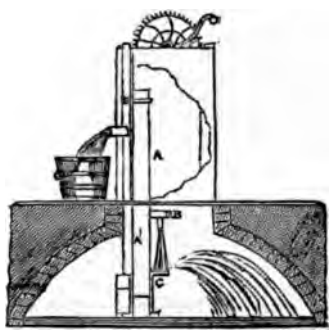
246,719. PLUMBER'S TRAP: ANDREW CA BROOKLYN, assignor to Paul P. Todd, New Yo Filed Jan. 14, 1881. Issued Sept. 6, 1881.—*Clai* trap for waste-pipes, having an air-inlet opening trap below the overflow-lip of the trap and at waste-inlet from the bowl or sink, and the waste-

>elow the normal level of the water in the trap, ' the waste-pipe is kept full of water. 2. A trap e-pipes, arranged in the vertical main waste-pipe lding, and provided with inlets to receive the waste



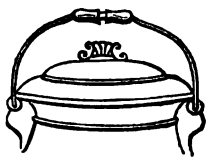
om the various bowls and sinks, whereby it serves) common to all said bowls and sinks, said inlets ranged below the normal level of the water in the d said trap having an air-inlet opening into the low the overflow-lip of the same, and above the lets. 3. A trap for waste-pipes, arranged in n waste-pipe as an annular basin around the overflow-lip, and provided with an inlet-opening waste water arranged tangentially, or substantially angles to its radius, as and for the purposes set 4. A trap for waste-pipes, consisting of the con- parts or necks B B^1, the annular basin C, its walls to connect the parts B B^1, the tubular overflow he waste-water inlets E, and the air-inlet F, all l for the purpose set forth.

01. PUMP AND WATER-ELEVATOR: CHARLES .RILL, INDIANAPOLIS, IND. Filed Feb. 28, 1881. Sept. 6, 1881.—*Claim*—1. The combination of the ith a tube or stop-cock extending therefrom, and a >on which the water falls, so as to be converted ay. 2. In purifying water in wells or cisterns, the



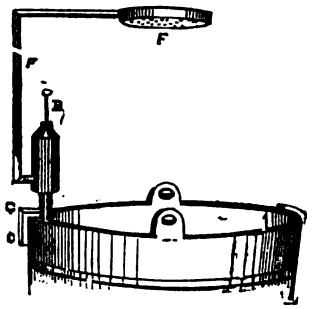
of producing a downward current of fresh air to the dead air on the surface of the water, which in dropping back into the well or cistern in the spray, a portion of the water being raised. 3. The ution of the stock A^1, having the enlargement D in r end, with the tube B, and shelf C, whereby the forced more rapidly from the stock.

81. COMMODE: JOEL A. H. ELLIS, BEAVER PA., AND HOMER LAUGHLIN, EAST LIVERPOOL, d June 23, 1881. Issued September 20, 1881.— 1. A commode provided with ears, having openings formed therein, said openings being er diameter at their lower portions than at per ends, in combination with eye-bolts inserted in enings, and fusible metal or equivalent material ling the stems of the eye-bolts for retaining them , substantially as set forth. 2. A commode pro- ith ears, having vertical openings formed therein, said openings being enlarged at their lower ends, in combination with eye-bolts having screw-threaded or corrugated stems, which are inserted in said openings, and fusible metal or equivalent material surrounding the eye-bolts,



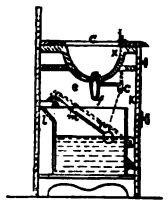
substantially as set forth. 3. The combination, with a a handle having an annular groove formed therein, of a rubber ring inserted in said groove, and extending outward beyond the surface of the handle, substantially as set forth.

246,849. SHOWER-BATH ATTACHMENT: EDWARD WILLIAMS, GRIFFIN, GA. Filed June 13, 1881. Issued Sept. 6, 1881. *Claim.*—As an article of manufacture the force-pump B, provided with the pipe E, the sprinkler F,



and the clamp C, consisting of a horizontal arm, having two downwardly projecting lugs, and the set screw D, whereby the pump is adapted to be attached to a tub, substantially as and for the purpose set forth.

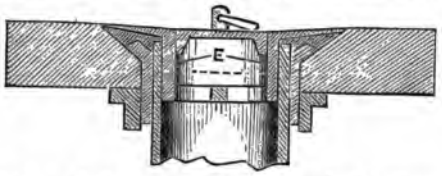
247,297. WASTE-WATER DISCHARGE FOR PORTABLE WASH-STANDS: NATHAN O. BOND, FAIRFAX COURT-HOUSE, VA., assignor of one-half to Addison Boyden, Brookline, Mass. Filed July 14, 1881. Issued September 20, 1881.—*Claim* 1. In combination with the



flexible discharge-pipe *e*, the collar 1, jaws 2, 3, spring *g*, and lever *h*. 2. The discharge-pipe *e*, the clamps for closing the same, and the lever *h*, in combination with the float *n*, connected with the weighted arm e^1, the spring *o*, and the spindle *p*. 3. In combination with a flexible discharge-tube and spring-jaws for compressing the same, a receiving-tank, and means for automatically preventing the compressing-jaws from opening to admit more water to the tank. 4. The combination of the lever *h*, having the hole *q*, of the weighted arm e^1, the spring *o*, the automatic float, and the spindle *p*.

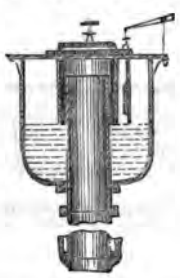
247,273. DRAIN-PIPE CONNECTION AND PLUG FOR BATHS, ETC.: WM. RICKETTS, CINCINNATI, OHIO. Filed July 15, 1881. Issued September 20, 1881.— *Claim* 1. The combination, substantially as before set forth, of the drain-pipe extending up through the bath-bottom, and the plug-seat secured only in the said drain-pipe. 2. The combination, substantially as before set forth, of the drain-pipe, the mass of solder around its

upper end for making a tight joint with the bottom of the bath or sink, and the flanged externally screw-threaded plug-seat screwed into said drain-pipe, and covering the solder-joint with its flange. 3. The combination, sub-



stantially as before set forth, of the bath-bottom, the counter sunk lining thereof, the drain-pipe, the flanged thimble encircling and sustaining the drain-pipe, and the nut. 4. The combination, substantially as before set forth, of the bath-bottom, the counter-sunk lining thereof, the flanged thimble, the nut, the drain-pipe, the solder above and around the flange of the thimble and the upper end of the drain-pipe. 5. The combination, as before set forth, of the bath-bottom, the counter-sunk lining thereof, the flanged thimble, the nut, the drain-pipe, the mass of solder for making a tight joint, and the flanged externally screw-threaded plug-seat.

247,386. DIP-PIPE: GEO. A. MCILHENNY, WASHINGTON, D. C. Filed January 6, 1881. Issued Sep-



tember 20, 1881.—*Claim* 1. In combination with an ascension-pipe passing upward through the bottom of the hydraulic main, a dip-pipe descending through the top of the main and encircling the ascension-pipe, and provided with a valve whereby communication may be opened or closed between the ascension-pipe and the main, substantially as set forth. 2. In combination with an ascension-pipe passing upward through the bottom of the hydraulic main, a dip-pipe descending through the top of the main and encircling the ascension-pipe, provided with a movable lid, and with a valve, whereby communication may be established between the ascension-pipe and the main.

SANITARY JOTTINGS.

SANITARY.

At a recent meeting of the Greenwich Board of Works it was reported that there had been a case of small-pox in an encampment of about 100 gipsies in about thirty vans and tents in Greenwich marshes. It was further stated that these people were without sanitary arrangements, and stole all the water they used from the Kent Water Company. Mr. Richardson, the Greenwich member of the Metropolitan Board, said that all that could be done was to drive these people away. The matter was finally referred to the Greenwich parish committee to report upon.

The Lambeth Water Company is now actively enforcing the adoption of proper water fittings, instead of the wasteful appliances which are the cause of the apparently excessive consumption of water, and of the delay in the extension of the constant-supply system.

The Sanitary Authority at Weston-super-Mare have resolved to spend £10,000 in drainage works, and on the introduction of the open system for the town sewers; and besides the erection of a hospital for the isolation of infectious diseases, other improvements are under contemplation.

A prize of the value of £100, offered by the Equitable Life Assurance Society of the United States for the best essay on 'Life Assurance', has been awarded to Mr. I. M. Dolan, F.R.C.S.Edin., of Halifax, Yorkshire.

On and after the 2nd of January, every establishment in Cincinnati in which a furnace is used must be provided with some device whereby the escape of smoke into the atmosphere will be prevented.

During 1881, sunshine was 38 per cent. of its possible duration in South-West England, 33 in South Ireland, 32 in South England, 31 in East and in Central England, 30 in North Ireland, 28 in Scotland and in North-West England, and 27 in North-East England.

The statistics of mortality, since the institution of civil registration, show that the death-rate of England reached its minimum in 1881, and actually fell to below 19½ per 1,000, or an addition of about 5 per cent. to the mean duration of human life.

Franz Schaffner, aged twenty-one years, an electrician in the service of Mr. Edison, died at New York from heart disease. His brother wished to have the body cremated. He was referred for information as to the only crematory at Washington, Pa., to the agent of the Pennsylvania railroad. After an interview with the railroad agent the brother gave up the idea of cremation. Franz Schaffner was a favourite son, and his brother wished to have the body cremated to send the ashes to his parents.

PERSONAL.

The Medical Officers of Mile End Old Town Union have received gratuities for extra services rendered during the recent small-pox epidemic. Messrs. Cæsar and Soame have been awarded twenty guineas; Mr. Atkins, fifteen guineas.—Mr. Edward Watson, public vaccinator, has also received a grant, for the second time, for successful vaccination.

Mr. A. M. Fowler, C.E., late Borough Engineer of Newcastle-on-Tyne, has commenced private practice as a civil engineer in that town.

For the appointment of Borough Surveyor of Pontefract, at a salary of £100 per annum, there were seventy-six applicants. Mr. James Heseltine, jun., of Pontefract, was selected to fill the vacant post.

Mr. G. W. Morrison's labours as Town Clerk of Leeds have met with the gratifying recognition from the Town Council of an increase of £250 to his yearly income of £1,000.

We regret to learn that Mr. James Wolstenholme, Surveyor for the Castleton Local Board, whilst disinfecting a house, caught the small-pox, and succumbed to the disease shortly afterwards at the Bury Union Workhouse.

The resignation is announced of Mr. Rogers, the Inspector of Nuisances for Sherness. The authorities have decided that the offices of Inspector of Nuisances and Surveyor shall be merged into one, and that candidates shall be invited for the situation. The salary is to be £150, apportioned as follows:—Inspector of Nuisances £80, Surveyor £70 a year.

LEGAL.

William Chippendale, a builder of Starbeck, Harrogate, has been fined one shilling, with costs nine shillings, for having committed a breach of the bye-laws of the Malton Local Board of Health, in having commenced to build some cottages without having given due notice to the surveyor, and also with having filled in the foundations of the same without giving notice as required by the 28th bye-law of the Board.

The owner of eleven houses in the parish of St. Pancras, which were found to be in a disgraceful condition, has been fined £10 and 2s. costs in each case, £112 2s. in all. The water-closets of these delectable dwellings were under the stairs, and were totally without ventilation and water-supply. The inspector could not find the accommodation

iout procuring a light, and the stench was overpowering. re had been cases of typhoid and scarlet fever in the iediate neighbourhood.

he Trustees of the Peabody Donation Fund have been imoned to the Clerkenwell Police Court for allowing ain premises in Bloomsbury, owned by them, to be a ance and unfit for habitation. Evidence was given wing that three very old houses were in a dilapidated, y, and unhealthy condition, and that there had consetntly been several cases of fever recently, while four sons had died. It was urged on behalf of the Trustees t they were not responsible; that they had arranged h the Metropolitan Board of Works to enforce the tizans' Dwellings Act, but that the Home Secretary uld not order the demolition of the houses till there was atch of fifteen. Mr. Hosack ordered that the premises ould not be used for habitation till further notice.

In consequence of the numerous accidents which occurred ring the past year through throwing orange peel on the thway, the Vestry of St. George-the-Martyr have deterned to take advantage of the powers possessed under Act relating to public nuisances, which are rarely into force. They have, therefore, caused notices to be ed throughout the district calling attention to the ger arising from this reprehensible practice, and intimatheir intention to prosecute offenders, who are liable to malty of from 40s. up to £5 for the offence.

We published in the SANITARY RECORD of Jan. 15, e 316, a report of the proceedings taken by Mr. Dobbs nst the Grand Junction Water-works. Mr. Dobbs has, stated, resolved to carry the case into another court, as magistrate, Mr. Cooke, decided in favour of the claim he Company, and against Mr. Dobbs. With a view to st Mr. Dobbs in the determination of the important tion raised, whether the Company are justified in ng their charge on the gross value of hereditaments, as orth in the Valuation (Metropolis) Act, 1869, instead of he rateable value, the Paddington Vestry, at a meeting on January 17th, resolved that the vestry should conate a sum not exceeding 100 guineas towards the costs Mr. Dobbs, in the event of his prosecuting his appeal nst the Grand Junction Water-works Company, and the clerk should be instructed to forward a copy of resolution to the various vestries and district boards in Metropolis.

An application has been made to the Judge of the Conorial Court (Dr. Tristram, Q.C.) in the case of St. Mary, ce Newington, in which a faculty has been ordered to a mortuary chapel, to set aside the proceedings, on the of a lady named Jephson, whose property would be reciated by such erection. It was suggested that there other eligible sites. The Chancellor said that he ld give the applicant leave to appear, and another site ld be proposed. However, the fact that property would depreciated was no reason for preventing the erection of lic mortuaries.

POINTMENTS UNDER THE PUBLIC HEALTH ACT.

r. Bushell Anningson, M.D., has been appointed ical Officer of Health for the Chesterton Rural tary District, Cambridgeshire, *vice* Ransom, resigned.—R. E. Huntley, Medical Officer of Health for the ington Quay Urban Sanitary District, Northumberland, 40 per annum (re-appointed).—Dr. J. Leitch, Medical er of Health for the Holme-Cultram Urban Sanitary rict, Cumberland.—Mr. Arthur Kempe, F.R.C.P., C.I., has been appointed Medical Officer of Health he Budleigh Salterton Local Board, *vice* Robert Walker, ., resigned.—Edward Scudamore Angove, L.R.C.P. ., M.R.C.S. Eng., has been re-appointed Medical er of Health for the Camborne Urban Sanitary rict until June 24 next, at the rate of £50 per um.—Mr. Alexander Samuel Leslie Melville has been inted Treasurer to the Glanford-Brigg Guardians Rural Sanitary Authority, and to the Gainsborough rdians and Rural Sanitary Authority, Lincolnshire, both *vice* the Hon. Alexander Leslie Melville, deceased.—Mr. Henry Whitlow has been appointed Surveyor and Inspector of Nuisances to the Sowerby-bridge Local Board and Urban Sanitary Authority, Yorkshire, at £125 per annum, *vice* Sutcliffe resigned.—Mr. Thomas Mathews has been appointed Inspector of Nuisances for the Croydon Rural Sanitary District, at £120 for one year, *vice* Chart resigned.—Mr. William Richard Evans has been appointed Inspector of Nuisances for the Llanelly Rural Sanitary District, Carmarthenshire, at £120 per annum, *vice* Rees resigned.—Mr. James Sharp has been appointed Surveyor to the Corporation and Urban Sanitary Authority of Beverley, at £170 per annum, with an office, *vice* Holt, resigned.—Mr. Arthur Henry Leslie Melville has been appointed Treasurer to the Caistor Guardians and Rural Sanitary Authority, Lincolnshire, *vice* the Hon. Alexander Leslie Melville, deceased.—David Edgar Flinn, L.R.C.S. Ireland, and Lic. Med., L.K.Q.C.P. Ireland, has been re-appointed Medical Officer of Health for the Brownhills Urban Sanitary District, Staffordshire, at £40, for one year.—There are vacancies for a Surveyor and Inspector of Nuisances to the Isle of Thanet Rural Sanitary Authority, at £150 per annum; for a Surveyor and Inspector of Nuisances to the Market Harborough Rural Sanitary Authority, at £120 per annum; for an Inspector of Nuisances for the Tunstall Urban Sanitary District, at £100 per annum; for a Clerk to the Barnet Local Board and Urban Sanitary Authority, at £40 per annum; for a Clerk to the Foleshill Guardians and Rural Sanitary Authority, Warwickshire; and for a Clerk to the Gainsborough Guardians and Rural Sanitary Authority, Lincolnshire.

THE SALE OF FOOD AND DRUGS ACT.—Mr. W. B. Harrington, F.C.S.E., has been appointed public analyst for the city of Cork, at £100 per annum, and 10s. 6d. for each analysis over 100, *vice* O'Keefe resigned.—Mr. Matthew Algernon Adams, F.R.C.S. Eng., F.C.S., has been reappointed public analyst for the county of Kent, at £25 for one year, and 6s. per analysis.—William Morgan, Ph.D., F.C.S., has been reappointed public analyst for Cardiganshire, at £5 for one year, and 15s. per analysis.—Mr. Thomas Alexander Pooley, F.C.S., has been appointed public analyst for the borough of Maldon, at 21s. per analysis for the first hundred, and 10s. 6d. per analysis beyond in each year, *vice* Whitmore deceased.—William Walter Stoddart, F.C.S., has been reappointed public analyst for the borough of Bridgwater, at fees as per scale, until August 5 next.—Theophilus Redwood, Ph.D., F.C.S., has been reappointed public analyst for the county of Middlesex, at 21s. per analysis for the first 100 in one year, 10s. 6d. each for the second 100, and 5s. each afterwards.—Otto Hehner, F.C.S., has been appointed public analyst for the Southern Division of Derbyshire, at forty guineas per annum for the first 60 analyses, and 10s. for each analysis above that number.—William Lindsay Emmerson, M.D., has been reappointed public analyst for the borough of Stamford, at £10 10s. per annum for the first 20 analyses, and 10s. 6d, per analysis above that number.—Mr. James Alfred Wanklyn has been reappointed public analyst for the borough of Buckingham at 20s. per analysis with certificate, until September 29th next.

NOTICES OF MEETINGS.

THE INSTITUTION OF CIVIL ENGINEERS.

At the Meeting on Tuesday, the 10th of January, Sir William G. Armstrong, C.B., F.R.S., President, in the Chair, it was announced that the Council had recently transferred Charles Benjamin Braham, Jacob Forrest, and Tom Hurry Riches to the class of *Members;* and had admitted Francis William Ashpitel, Percy Bingham, James Fettes Boulton, Francis Boynton, George Frederick Charnock, William Chatham, George Charles Denison, Alexander Graham Drury, James Fawcus, Francis Richard Flindell, Ernest Edward Gabriel, Alfred Hill, Joseph

Henry Hirst, Edward Ramford Jackson, Ernest Allen Horsford James. Christopher Little, Henry James Marten, Alfred William Palmer, Martyn Noel Kidley, William Henry Severn, Edward John Silcock, Robert Algernon Sumner, and Fred. Spencer Yates, as *Students*. At the monthly ballot, Thomas Hughes Gibbons, Cornwall Railway, and George Farmer Thomas, Wrexham, were elected *Members;* and John Edward Augustus Jenkins Blandy, Erith; Henry Ewart, Manchester; Isoji Ishiguro, Stud. Inst. C.E., Westminster; Joseph Lynch, Leopoldina Railroad, Brazil; James Osborne, Rio Tinto, Spain; and Herbert George Sumner, Stud. Inst. C.E., Brading Harbour Works, Isle of Wight, *Associate Members*.

THE NATIONAL HEALTH SOCIETY.

A Lecture by Frederick Treves, Esq., F.R.C.S., of the London Hospital, on 'The Dress of the Period', will be delivered at the Town Hall, High Street, Kensington, on Saturday afternoon, February 25th, at Four o'clock. Dr. Andrew Clark will take the chair. The lecture will deal with the following points:—The 'dictates' of fashion. Tight lacing as a matter of beauty, of sense, and of health. Are stays a necessity? Tight dresses. The evils of certain modes of dressing. Superfluous clothing. The human foot and the modern shoe. High heels, and their effect upon the muscles and the gait of the wearer. Fashions of dressing hair, etc., etc. Tickets may be obtained at W. Rogers', Stationer, nearly opposite the Hall, or at the Offices of the Society, 44, Berners Street, on Mondays and Fridays, 2 to 5, or will be forwarded by post on application. Members of the Society are entitled to a ticket for the lecture. The prices of admission are as follows: Reserved Seats, 2s. 6d.; Admission, 1s.; Payment at the Doors, 2s. 6d. and 1s. Special Arrangements will be made for Schools.

THE SANITARY CONGRESS AND EXHIBITION.

A deputation from the Sanitary Institute of Great Britain, consisting of Prof. F. S. B. F. de Chaumont, M.D., F.R.S., Chairman of the Council; Mr. G. J. Symons, Registrar; Prof. W. H. Corfield, M.A., M.D., Chairman of the Exhibition Committee; Mr. E. White Wallis, Secretary; and Mr. E. L. Box, Curator of the Exhibition, have met the Mayor and Sanitary Committee at Newcastle-on-Tyne, to make arrangements for the Congress and Exhibition, which is to be held by the Institute in that town in the autumn. The Congress and Exhibition will be opened on Tuesday, September 26th, 1882.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, 17th February, at 7.30 p.m. The minutes of the last meeting will be read. The following gentlemen having been duly proposed will be balloted for:—*As extra-Metropolitan Members*. Mr. C. Ticehurst, Medical Officer of Health for Petersfield Rural Sanitary District, proposed by Mr. S. F. Murphy and Dr. Vinen; Mr. A. E. Harris, Medical Officer of Health for Sunderland, proposed by Dr. Corfield and Dr. Browning. *As Associates*. Dr. P. Burgess, Staff Surgeon, R.N., S.S. Cert. Camb.; Dr. Carl Renner, 80, Portsdown Road, proposed by Dr. Corfield and Dr. Browning; Dr. G. D'Arcy Adams, S.S. Cert. Camb., St. Stephen's Crescent, Maida Vale, Dr. F. Hicks, Hospital for Consumption, Brompton, proposed by Dr. Corfield and Dr. Vinen; Dr. A. Whitelegge, B.A., S.S. Cert. Camb., Knutsford, Cheshire, proposed by Dr. Corfield and Mr. H. H. Mason. At eight o'clock a paper will be read by Dr. Alfred Carpenter, entitled, 'Some of the Causes which increase or modify the infectivity of Scarlatina.'

The meeting appointed to be held on the 17th March will be devoted to short communications and discussions on sanitary subjects. Members desirous of introducing any subject are requested to communicate with the secretaries.

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will be subjected, if unnecessarily long, to a strict curtailment, however.

1. The Comicalities of Sewage.

Do you think that a book fairly illustrated, and entitled 'The Comicalities of Sewerage', would prove a useful work, containing, as it necessarily would do, the history of many absurdities perpetrated by ignorant builders and others who have to do with the drainage of our houses and public buildings? ENQUIRER.

[We do not think that bad sewerage or faulty drainage should form the subject of any such title, or be treated in any jocular manner. The work of Mr. Pridgin Teale, published by Messrs. Churchill, of New Burlington Street, London, has its ludicrous side, and makes one wonder how many things which he notices there, and depicts in a dashing style, could possibly have obtained anywhere, and, is also a book most unique in its kind, and most worthy of perusal by everyone. We know, moreover, that two works are now preparing for the press, dealing exclusively with the faults in carrying out drainage and their remedies. Possibly 'Enquirer may prefer to see these books before he thinks further of taking a hand in the game.

2. Faults in Lead Soil-Pipes.

Have any of your correspondents or yourself ever noticed any faults, strictly so-called, in a new drawn lead soil-pipe which has just come from the makers? READER.

[Sometimes we have noticed drawn pipes to be somewhat too thin on one side, but this is not a common occurrence, and would not be likely to cause danger, provided that there was a proper and constant current of fresh air through the soil-pipe from top to bottom. We, however, saw a short time ago a piece of new drawn lead which the engineer intercepted before it was fixed, and to which his attention was drawn by observing a few curious spots upon its surface. On probing these spots with a common pin, the pin went right through into the interior of the pipe without any trouble, proving plainly that there was no proper metal there. We do not think for a moment that these holes were purposely stopped up, but that the whole of them were caused during the drawing of the pipes. We should, ourselves, be glad to know if anyone else has ever noticed such a thing, or can give any sound reason for it.]

3. Flaps in Area Vaults.

I lately came across a house-drain, the major portion of which lay constantly under water, owing to the action of a heavy flap—not at the outfall into the sewer, but in the area vault—which was evidently intended to keep back rats. Is such a thing of common observance. M. E.

[We fear that such cases are very common. We can understand that low-lying drains debouching into a river subject to high floods may sometimes fill up a portion of the drain for a very limited time, and until the waters subside, but if the drain be a long one, and with a proper disconnection-chamber between the house and the portion liable to flooding, and if there be proper ventilation, it would not cause any evil for the time. Sometimes, also, it is necessary to fix a tidal valve between the outfall and the water subject to rising, but this would, of course, have the effect of keeping back the undiluted sewage in the drain until the water had retreated. We rather suppose that our querist, 'M. E.', refers to drains where sewage is kept in the drains permanently, when such a state of things could have been avoided by a proper fall, and a proper treatment at the outfall. A serious fault of this kind we noticed a few days ago in a London square in a S.W. district. Here the drain was some 90 feet in length, and had stood half full with its own sewage ever since the chain was laid. There was a flap in the sewer, a very heavy flap in a brick chamber in a coal cellar in the front area, and a large dip-trap again at the threshold of the door. The fall from end to end was barely ¾-inch. On taking up the drain, the engineer found he could obtain ample fall throughout, and even allow a few inches extra for a disconnection-chamber.]

ERRATUM.—Our attention has been called by the Town-Clerk of Exeter to the fact that in consequence of a misprint, the result of an inquiry into the water-supply of Ely has been attributed to Exeter in the SANITARY RECORD of January 15, page 289. We greatly regret this mistake, the more especially as it seems to have caused considerable annoyance to the authorities. Mr. Wigner, I.C.S., and Mr. R. Percy Boulnois, M.I.C.E., bear testimony to the exceptionally good quality of the water supplied to Exeter, which however has only been impeached by a clerical error.

ORIGINAL PAPERS.

E DWELLINGS OF THE POOR.*

BY C. S. LOCH.

S are too often enchanted boats into which
ees, like Don Quixote and his Squire, launch
/es in full assurance that, with magic speed,
I reach the equinoctial line, while they float
lown on the current of the foregone conclu-
which public opinion for the moment tends.
:y degrees of latitude which in imagination
:n traversed, practical after-judgment knows
few yards only. Are not Rosinante and
; ass upon the shore still visible, and remind-
: home? And though we are making these
ips, does not Sancho's sorrow for the faithful
as left and fears he may not see again, force
nk of real life and its hard conditions? But
len comes the swifter current, and upsets the
ss impracticable boat, and our Committee-
in the water, and have to pay costs to the
t fishermen whose boats they have damaged
short-lived enchantment.
:cent history of the dwellings question sug-
areer too like this. The evidence given in
)re the Parliamentary Committee on Artisans'
)ourers' Dwellings' Improvement, affords
for a comparison between past hopes and
:xperiences.
3 it was thought that if the Local Authority
ers to purchase condemned property, and
adjacent to that condemned, paying full
ation to the owners, Dwellings' Companies
uy up the cleared sites; the lowest self-
ig class, viz., labourers earning less than
week, would be housed; and re-construc-
ild be both practicable and profitable.
y practice, how do these proposals appear?
to purchase of property: 'We clear',
Chairman of the Commissioners of Sewers
)cal Authority for the City—'two sites at
f over £2 a foot, and the highest tender
et is 4d. a foot rental; we lose £1 13s. 4d.
If we had given every man, woman, and
oo, and £150 to start them in life some-
se, it would have been cheaper to the rate-
f the City.' There certainly are enormous
es acquired by the removal of uninhabitable,
substitution of sanitary dwellings, but the
an hardly be called profitable.
in regard to compensation, the same witness
think the science of compensation has been
operation very freely indeed. . . . When-
iblic body, like ours, undertakes to build, it
ialf as much again as anybody else.' Much
vidence submitted to the Parliamentary
:e is apt annotation on this text. Referring
tenants, Mr. Rodwell, the present Arbitrator
Artisans' Dwellings' Acts, says: 'It seemed
e very active agents had been there, and
to the people, you cannot do any harm;
iot get less than you have got if you appeal,
will probably get more. I do not think that
nt. of the small appeals were *bonâ fide*.'
re manufactured. They were, for example,
oo, when the award made only amounted to £500; Mr. Rodwell, in this case, cut down the costs to £20. The monthly and weekly tenants claimed £43,760 on the Goulston Street scheme; the provisional award was £10,795, the final award £13,700; there were 393 claims, which, after the publication of the provisional award, were increased to 500. Three surveyors had been employed at 50 or 60 guineas a piece, when one would have been enough. Mr. Richardson, for two years the Chairman of the 'Works and General Purposes Committee' of the Metropolitan Board of Works, instanced a claim of £7, on which £8 was awarded. Upon this an appeal was made for £500; £16 was awarded on the appeal; the surveyor's and solicitor's costs were £9 9s. This and much other evidence shows that, in arming a Local Authority to purchase compulsorily, the community is thrusting it into a position, in which, from its corporate character, it is looked upon as the fair prey of needy and unscrupulous men of business, and tradesmen. *Caveat emptor*! And the *emptor* is not, in this case, like the owners of some uninhabitable properties, a shrewd uncompromising business-man, with an eye to a minimum profit of 12 per cent. under any conditions which are not absolutely criminal, but a peculiarly constructed Board of Works, with the aspirations of a municipal authority, and the imperfections of a vestry. Notwithstanding the ability of the present arbitrator, in the pestilent swarm of false and fictitious claims it must be difficult to make purchases by the Local Authority profitable.

The constructive work—the erection of buildings for the lowest self-supporting class—has hardly been more satisfactory. The class residing in the cleared areas cannot afford to pay more than three or four shillings a week in rental. In artizans' dwellings, sets of rooms are to be had from six shillings upwards. 'If you swept away the houses, and built dwellings five or six storeys high, you would make the area healthy', Dr. Lovett of St. Giles said, 'but you would not provide for the people. It is the people, and not the properties, that are the cause of the evil.' Mr. Nichols, the architect and surveyor employed by the Home Office in connection with the Artizans' Dwellings Acts, said: 'I think you will find in practice that not one-tenth of the persons at present occupying sites will find their way into new buildings, upon any area, a mile or two off, that might be bought. All that can be done is to raise the surroundings of the people.' Mr. Moore, the Secretary to the Improved Industrial Dwellings Company, said that they could not accommodate, for instance, a widow who could only pay four shillings rental; she must go where she could get a single room. The cost of building is greater, he said: there is increased suburban competition; there is some competition also with the Peabody trustees; the tenants cannot afford to pay higher rents; the Company's profits are limited to 5 per cent., because such a percentage is a fair return, considering the security offered, and 'they feel that the day may come when they may not be able to earn 5 per cent.' They are unable to solve the problem of dealing with the very poor. The cost of providing the dwellings would be greater than these people could pay them a return upon. 'I have always felt', Mr. Moore said, 'that the accommodation for the very poor was a matter for the Peabody trustees.'

This conclusion is hardly satisfactory; it is still less so when the evidence regarding the dwellings of the Peabody trustees is considered. By way of giving to the displaced population a preferential

of the Dwellings Committee of the Charity Organisation
gust 1881. Longmans, Green, and Co. Report of the
ry Committee on Artizans' and Labourers' Dwellings'
t, 1881.

claim, offers were made to the tenants at Whitechapel to re-settle in the new Peabody Buildings on that site; 167 expressed a desire to move into the buildings, but of these, only twelve had done so in July. Twelve families had moved in from adjoining houses; 65 from the neighbourhood; the remainder, 179, had come from other places. The Peabody trustees provide very few single rooms; they let three rooms and a scullery for 5s. 3d. to 5s. 9d., which the Dwellings Companies would let at 8s. to 9s. But it is the nature of charitable benefits to disobey the law of gravitation. As has been proved in the educational endowments, the very poor and the lowest self-supporting class cannot be provided for, because the struggling respectability of those next them in the social scale, afraid of sinking to a like level, elbows inferiors out of the way. The trustees must have as respectable tenants as possible in large buildings, in which, without close supervision, there might be the worst results. It is the lowest self-supporting class—non-paupers who might become pauperised—which, if it can be differentiated, and the trustees have not an impossible task to perform, should be the object of their care. But this class they cannot accommodate.

To take one point more in the proposals of 1873. Full compensation to the owner, as a condition of purchase in 1873, has now resolved itself into this, if the proposals of the Metropolitan Board of Works, which Mr. Rodwell appears to approve, are adopted; that, in the case of uninhabitable houses 'the value of the interests of the various parties in the property' should be compensated on the assumption that such houses are 'incapable of being let as dwellings'. For houses which may be made habitable, compensation should be paid on an estimate of the fair market value of site and houses, less estimated cost of rectifying and removing all sanitary defects. Only for habitable houses would fair market value be given without deduction.

On all these points, then, there are grave differences between the views of experts in 1873 and 1875 and in 1881. A plea for a somewhat more cautious and scientific treatment of the subject can hardly, therefore, be disregarded. One or two portions of the evidence given before the Parliamentary Committee require special attention from this stand-point. We allude, in the first place, to the effect of the introduction of charity into this branch of social work. We have seen that the Peabody Trustees do not house the very poor. Were they traders they could make 5 per cent.: actually they make 3 per cent. They have a capital of £780,488 on their two trusts. They carried to the credit of their capital account last year £29,751. They have no dividends to pay. For their recent purchases, amounting to about £100,000, and for building they borrowed £300,000 at 3½ per cent. from the Treasury; Dwelling's Associations have to pay 4 per cent. on similar loans. Their own surveyor said that they bought six sites of the Metropolitan Board of Works 'at 50 per cent. less than their fair market price for Artisans' Dwellings or the price which might have been given by societies, even those restricted to 5 per cent., 'It is to be borne in mind,' he said—and the Board accepted this view—'that the land will always be preserved for the public benefit for charitable uses; the fund is charity money. It is not like a commercial speculation, making large sums of money out of it and putting it into private pockets.' In this spirit four very exceptional conditions of sale were conceded. We compare them in each case with the conditions required of other would-be purchasers. (1) It was agreed that the Peabody Trustees should pay as purchase money the yearly rent for each plot capitalised at twenty years' purchase. On the other hand, when the Royal Mint Street plot was put up for sale by auction in June 1875, the advertised terms were the purchase of the ground-rent at twenty-five years on a building lease of eighty years. (2) It was agreed with the Peabody Trustees that such modifications only should be made in the scheme as the Secretary of State, upon the application of the Board (*to be made at the request of the Trustees*) might permit; but in the conditions of sale by auction the lessee had to submit to any modifications which the Board or Secretary of State thought fit. (3) It is the practice of the Board in all its leases to require that any dispute or difference should be decided absolutely by its own architect; this was waived in the agreement with the Trustees; the Secretary of State was made the arbitrator in case of dispute. (4) In the sale by auction the Board stipulated that on a breach of the covenant by the grantee or his executors, it should be allowed to re-enter, and the whole of the premises should revert to the Board: but it was agreed with the Trustees that if there was a breach of covenant, the Board should require them to re-convey the fee-simple of the whole plot, or *the part in respect of which such breach should occur*, at the same price as that at which the Trustees had bought it. When the Board ventured to ask four pence a foot all round, which on their surveyor's own showing was less than the value, the Trustees, from their position of absolute independence of shareholders and profits, replied 'that their offer was one that could by no means be made by any one excepting the Peabody Trustees, who were a body actuated solely by a regard to the interests of the working-class', and the Board, fidgetting apparently to get rid of the troublesome sites, if possible, in one and the same bargain, were willing to submit to any terms, and excluded all other competitors by making a private contract with the Trustees. Since then a further purchase has been made by the Trustees; and their surveyor looks to a future, not many years hence, when their income will be £100,000 a year, and 'at that stage it will grow rapidly, and all I can say is, "we must buy up all the other companies and reduce their rents".' When that time comes no 'ordinary builder' will be able to compete, and the master workmen, who say that they 'cannot have their men living away from them,' will have them lodged in Peabody buildings at considerably less than cost price, for to the Peabody Trustees the future of thus housing the 'artisans' of London is not a formidable interference of wages, likely to react to the detriment of the workman, but a very great advantage to that class. In contrast to this reckless disregard of all economical principles, large firms, such as Combe, Delafield, and Co., and Messrs. Pfeil and Stedall, are purchasing tumble-down houses and rebuilding them, because they, too, cannot have their men living away from them.

We thus see a large charity usurping the functions of commerce in such a way as will interfere with the efforts of capitalists to provide for their own workmen, and the speculations of commercial associations to build dwellings for artisans. It supplies habitations at less than cost price for a considerable population; and this is said to be done in the interests of the very poor, who reap but little benefit. Does not Mr. Peabody's munificence appear likely to become an 'American weed' in English waters, displacing not

only tumble-down dwellings, but also well-meaning Dwellings' Associations at the same time.

But the question is worth considering—What would have been the effect, if the land had been sold to a Dwellings' Association, instead of to the Peabody Trustees? The direct loss would have been less if Mr. Viger's statement be accepted, that a Dwellings' Association could have paid for the land 50 per cent. more; and the indirect advantages to the rate-payers by increased rating and increase of the value of neighbouring property would have been at least as great. Rentals of houses near the new Peabody buildings in Wild Street had increased from £55 to £75. There is much to criticise in the action of the Board, which Mr. Torrens asserts to be 'in antagonism to Parliament'; and the proposal of Mr. Richardson to pull down insanitary houses without giving the owner compensation, and forbidding him to rebuild on the old 'footings', so as to prevent new houses being crowded on the already too crowded sites, may be an extreme measure. But the provision which Artizans' Dwellings' Associations would have made, would have been for a class but little superior to that which usually tenants the Peabody buildings. The lowest self-supporting class would have been as much unprovided for as ever. The necessary street improvements would have had to be made in either case, at such minimum cost as the Board could arrange. Large areas of land in Central London, the market and place of business of three millions of people, would be occupied by houses which would, under the most favourable conditions, pay a bare 5 per cent. Such a withdrawal of means is a loss to the whole community, to the labourer as well as to the capitalist; and the Local Authority, as it would sell at about 3½d. land worth, for commercial purposes, more than 1s. a square foot, would give the difference as a bounty upon the erection of artizans' dwellings, or if poor rates are State-charity, as a charitable donation towards the cheapening of the rents of the tenants of dwellings in central sites. Such a line of argument may be in antagonism to Parliament, but Parliament is not always wise. Whether, therefore, the land had been sold to a Dwelling's Association, or to the Peabody trustees, the question is only one of degree, though the aggressive conditions under which the Peabody trustees have acquired the property, and will turn it to account, make the degree of difference a very important one.

The conclusion we draw is that interference, whether by the state or by charity, in the known and self-regulating conditions of economic life is baneful to the community. All are agreed as to the necessity of the removal of fever dens and plague spots. Let the state limit its action to negative and sanitary work. It prevents the importation of diseased meat; it never, except in the extreme cases of famine or siege, would become wholesale merchant or agent. Why should a principle adopted in so many departments be set aside in this? The existing legislation for sanitary purposes, though defective in some points, has a large scope. Torren's Act, as amended, gives the Local Authority very ample powers for the removal, not only of uninhabitable houses, but also of houses which interfere with the proper ventilation and sanitation of a site. Many of the owners of this debased property are rich. Let it be their charity to do their duty by their property. Let the State insist on this, be the owners rich or poor, instead of vainly attempting to assume a costly agency, which it cannot creditably undertake. And, if public opinion must be stirred before the over-busy and the too-idle can be brought to heed the abominable and degrading conditions under which, within a stone's throw sometimes of most respectable 'Squares' and 'Rows', the labouring classes, upon which they are most dependent for their daily comforts, herd and sleep, let those who wish to convince them compel them to attend, as they thrust under their notice in the press and in periodicals, in plays and in the pulpits, facts brought to light by a patient study of the question by Inspectors of Nuisances in the employ of volunteers instead of vestries, and by investigations, after inquests, of the conditions under which deaths occur in unwholesome localities. It is proposed that a few members of the National Health Association, and of the Dwellings' Committee of the Charity Organisation Society, should undertake this work, and employ an inspector for this purpose, and those who wish for practical and lasting reforms could hardly do better than support such a proposal.

Some details dealt with by the witnesses before the Parliamentary Committee, and interesting to the student of this subject, we desire to refer to shortly. The evidence with regard to 'levelling up', *i.e.*, the indirect improvement of the dwellings of the lower classes through the provision of dwellings for those above them, and the upward shifting of the badly-housed to the vacuum thus created, is extremely vague. Dr. Griffiths, of Clerkenwell, said that the lower class never got into the 'dwellings', they went to houses formerly inhabited by one family; there were thus in a single house sometimes eight families to eight rooms, with only one closet. This is hardly 'levelling-up'. It is astonishing how little scientific evidence there is on this crucial question. We want observers to ascertain for us the movements of the people under such conditions as those created by the Act of 1875. On experimental inquiries a thorough basis for reform might be founded. The generalisations and hearsays which are now the recognised substitute for these lead only to confusion and hopelessness. If a few men would watch and learn about men, as Sir John Lubbock watches his ants, we should be more likely to get at the facts of life under the checks and limitations which a complex civilisation is continually placing upon natural laws.

The medical evidence is, with one exception, strongly in favour of suburban extension. The people, it was said, would be benefitted 'both in health and pocket'; and Mr. Gatliff's statement in regard to the tenants in the dwellings of the Metropolitan Association, shows that the necessity for artisans and labourers living near their work has been greatly exaggerated. Several new Railway Bills are now before the House, and those who are of this opinion should use their influence to ensure cheap working-class fares. The Great Eastern Railway now carry such passengers 12 miles for 1d., and 1d. the return journey. Such a tariff as this should be taken as indicative of what other companies ought to do. The Railway Bills to be brought before the House this session contain provisions for fares at a much higher scale. Railways should also be required to allow cheap fares to printers and others, whose hours of labour make it impossible for them to use the workmen's trains. The aggregation of these men and their families in densely-crowded parts of Central London is a great evil that might easily be avoided. Continuous attention ought also to be paid to the arrangements of the Railway Companies in making clearances. It is most important

that the clearances should be made very gradually. Much hardship may thus be avoided.

Two suggestions made by the Medical Officers should not be passed over, viz., that the power of the Surveyor to bar, under Torrens's Act, the accomplishment of the changes which the Medical Officer has thought necessary, should be modified or set aside; and with a view to the prevention of overcrowding and other evils, that a clause should be inserted in the Nuisances Removal Act to allow of the visitation of houses, after 9 p.m.

There is one more question of detail—the procedure under the Act. The following may be read as the itinerary of a 'scheme'* through official domains, a slow and solemn royal progress :—

Scheme is approved . . .	Aug. 11, 1876.
Arbitrator is appointed . . .	Dec. 17, 1876.
Arbitration concluded . . .	Dec. 1877.
Titles investigated and notices given by Board to persons to be compensated	July 1878.
Thirteen weeks' notice . . .	Nov. 1878.
Board begins to consider conditions of lease and correspond with Home Secretary	Aug. 1878.
Conditions settled	Dec. 1878.
Property advertised for tender .	Jan. 1879.
Modifications in lease made . .	March 1879.
Property advertised for auction .	May 17, 1879.
Peabody Trustees make offer . .	May 26, 1879.
Agreement settled with Peabody Trustees	Mar. 4, 1880.

The 'scheme', it will be seen, started on its journey on 11th August 1876, and arrived at its destination on the 4th March 1880. The journey occupied 3 years and 6½ months. Measured politically, *e.g.*, by the time which it takes to pass an Irish Land Bill, or geographically, by the time which it takes to travel round the world, this is a vast expenditure of time. The machinery of the Act is undoubtedly cumbersome, but the mechanics can scarcely be considered skilled. To the question—'The course of the Board has been to proceed step by step, and never to look forward to the succeeding step until you had completed the first?'—the answer is, 'I think that will be putting it correctly', a sufficient admission on the part of the Board of their conduct of the business. It appeared that they kept no records as to the dispersion of the people from the cleared sites, and that they had not acted on the section in the Amended Artisans' Dwellings Act, 1879, by which 'equally convenient accommodation' might be provided at some other place than the area or its immediate vicinity. They made no census of empty houses, nor did they represent to the Home Secretary, with any definiteness, where there were empty houses to which the displaced might remove.

For the improvement of the procedure, it is suggested that monthly and weekly tenants not carrying on business should be paid compensation on a fixed scale, *e.g.*, 20s. to a tenant paying a rent of 5s. a week; that houses unfit for habitation should be closed by the Local Authority before arbitration, or by the arbitrator; that there should be no provisional award, but that the Local Authority and the occupiers should come to terms between themselves, with an appeal to a standing arbitrator; that, in cases in which the compensation exceeds £3,000 (the limit is now £500), an appeal should be allowed from the arbitrator to a jury; that, as soon as the scheme has been approved by the Government, no allowances should be made for improvements in the houses, or alterations, beneficial to the tenant, in the terms of leases; that the practice which has grown up of charging the Local Authority with the costs on both sides in all cases, except when the sum awarded to the claimant is the same or a less sum than that offered by the Local Authority, should be set aside; and that the conditions for the replacement of the people on the same area should be relaxed.

With an overworked House of Commons, which has to reform its own methods of procedure in the midst of engrossing political agitations, it may be feared that a long time will elapse before Parliament can make the desired modifications in the Artisans' Dwellings Act. It is a matter of doubt whether, with all these modifications, the Act will produce the results its advocates expect. But in any event, individuals, singly and in combination, can effect much by ascertaining facts, and by educating and stimulating the public conscience. In many things, Cobden's advice to the working-classes, in regard to the hours of labour, remains true: '*Look not to Parliament, but only to yourselves.*'

* This is the Royal Mint St. and Glasshouse St., Whitechapel, Scheme. It is the one regarding which the details of procedure were submitted to the Parliamentary Committee. But it is also fair to say, that it was the first scheme with which the Board had to deal under the Artisans' Dwellings Act.

SOME OF THE CONDITIONS WHICH MODIFY OR INCREASE THE INFECTIVE CHARACTER OF SCARLATINA.*

By ALFRED CARPENTER, M.D. Lond., C.S.S. Camb.

THE difficulty which frequently arises in satisfactorily accounting for the continuance of scarlatina in a given house or block of buildings has at times to be overcome by supposing that it has been reintroduced by means of a post-letter or a book, or by some other material which has been traced to, or only supposed to have been in contact with, a preceding case, or else to the continuance of infection upon a person who has recently recovered from the disease. These cases are so numerous that some writers have not hesitated to insist upon a quarantine of some eight or ten weeks, and even four months, before a child who has recently suffered from the disease should be allowed to mix with his fellows again. The result of this action has been to entail very heavy loss upon families who have complied with the instruction, and in many cases serious injury has resulted to the health of the sufferer who has been thus ostracised, and but too often deprived of the pure air and friendly intercourse with his fellows which is so necessary for the rapid re-establishment of good health. It has also given rise to an apprehension, almost amounting to panic, among some people, whenever a friend's child has been re-introduced a short time after recovery from the effects of scarlatina. Evils may result as serious in the one case as too often follow from negligence in the other, and whilst rashness in mixing convalescents with healthy persons is to be deprecated, a too long continuance of quarantine is also to be protested against, if it can be shown that it is unnecessary. 'Rigorous and universal isolation' is no doubt absolutely required whenever and wherever the disease occurs in its early stages, but to continue this for many weeks is highly prejudicial to the temporal interests of the unfortunate sufferers and their friends, and is especially so in regard to schools

* Read at the Society of Medical Officers of Health, Feb. 15, 1882.

:h have become the arena in which the disease appeared. I have for many years acted upon opposite path, restricting the isolation to a fort- ıt only, and in some cases limiting it to one week : the departure of the fever; and in no case have d any reason to regret the course which I have ɔted.

have for a long time past had my own opinion as ıe causation of scarlatina, and of the conditions :h modify or increase its infectious character. se opinions have been based upon an experience :h has not been narrow, or restricted to a practice ng one class of persons or to one district. It formed at a time when I had good opportunities eing able to isolate persons and families among better class of people, and to inquire very inti- ely into the causation of the disease. A more nded experience derived from observations ng large bodies of children has produced evi- e, some of which I now propose to submit to critical consideration of this very important ety.

ıe first set of cases to which I will draw atten- occurred in a large school in Croydon where atina appeared over and over again between the s 1849 and 1854. The house was then vacated, the school removed to another place. Every- ; was done in that house, four times in succession, move the cause of the disease, but without effect. schoolmaster spared no expense and no trouble: id everything which sanitary science dictated, he disease re-appeared. The cause for its re- arance was always charged upon something h was supposed to account for it, which some- ; was not thought likely to occur again. But rtheless the disease did re-appear. The house closed and unoccupied for a time, then it was pied by another family; the disease reappeared after it was again inhabited. This family soon t; the house was shut up again. Ultimately it again occupied as a school, but before it was ed, considerable alterations were made in its ar- ements. I made a close examination of it, and ieve that I discovered the reason why scarlatina sted in infecting the inmates. In the year 1851 w system of sewerage was carried out in this of Croydon. The house in question was con- ed with this system, and water-closets were duced in the school-yard. It was supposed the cesspool belonging to the old privy was filled One was so treated, but a second (a kind of b well in a porous soil) was not discovered, and not disturbed. In repairing the school-yard second cavern was found, and the morning after ıs laid open it was seen to be half-full of bloody r. Further examination was instituted, and it then discovered that the unused cesspool had me the recipient of the washing from a neigh- ing slaughter-house, and that hot and cold water found a way into the cesspool; and further ıination showed that it recurred at least once a , displacing the aërial contents of the cesspool the closets and urinals of the boys, and explain- he cause for complaints which, at the time when were made, seemed to be unaccountable. The ɔool was filled up, the slaughter-house sewer was ɔpped and made to discharge its sewage in the direction, viz., into the sewer. The house has occupied as a school since 1862, and there has been any outbreak of scarlatina among the ɔants from that time to this. It must be evident :he cesspool in the school-yard was intimately associated with the re-appearance of scarlatina; that it contained some material which continued the vitality of the disease germs, I think from being fed with water containing blood products, and which were displaced by the introduction of fluid every week.

The second case has been published, but I will reproduce its salient points. There is a large private school at Blackheath. Scarlatina appeared in October 1868, in July 1871, in March 1874, and again in October 1874. These outbreaks corresponded with a general tendency to the spread of scarlatina in all parts of the country. Every precaution was taken in the school by the proprietor to remove infection from the premises, and with the exception of the first case, which arose in 1868, it did not appear how the disease found its way among the boys. On the last occasion on which it made its appearance four boys were all affected within twenty-four hours. These boys must have taken the infection from a common cause. They did not take it in the dormitory, for each occupied a different sleeping apartment. It was not introduced by either servants, attendants, or masters, for these, although numerous, were all well, and were carefully examined, so as to be sure that no case of ambulatory scarlatina existed among them. Of this class only four out of sixteen had previously suffered from the disease, so that 75 per cent. of them were liable to be affected by it. If one boy only had fallen ill at first, instead of four, it might have been traced to some supposed outside cause, which might have been thought to have explained the outbreak. This had been done on former occasions, but this time there was a concurrence of cases which could not be explained, and there was nothing in the economy of the household which could by any manner of reasoning satisfactorily account for the re-appearance of this disease. The first point which gave a clue was the fact that the four boys only came into direct communication in one of the class-rooms, but they were not in the same class in that room, and therefore not in contact with each other. I placed the boys, in idea, in the position they occupied in the room, and found a certain alliance between them; and when the position which the boys who had first suffered in former epidemics was enquired for, it was seen that they occupied the same seats as those now affected. The position of eight boys who had suffered in the preceding spring was clearly made out. It was seen that they occupied an oblique line across the class-room, in the relationship of two or three at each form or table, midway between the middle window of the room and a door at the north-east corner. It appeared that both door and window would require to be open for the proper ventilation of the room, and that the current across the room would (when there was one) impinge upon the affected boys, and that only the middle window would be open on cold days. A close examination of the surroundings of the house showed that it was not possible for anything injurious to find its way into the room by the windows, for the country was open on that side of the house. Every possible care had been taken to prevent anything being communicated from the baths or closets or other conveniences belonging to the house, for they all communicated, indirectly only, with the sewer, which is the main sewer on Blackheath Hill. The door at the north-east corner communicated with a passage leading to a lobby, into which opened another class-room, also the boiler-house, the boot-lobby, the swimming-bath, and still further away from the

class-room were the latrines. Closely-fitting swing-doors apparently shut off all communication between these parts of the premises and the school-house. A closer examination revealed the fact that the doors in the lobby acted as suckers on a piston-rod, and drew air backwards or forwards out of, or into, the class-rooms towards or from the bath-room and latrines. The class-room was occupied by about forty boys, and as the consumption of air by these must be great, the temperature of the room being raised by their bodies, the window being nearly always kept open for ventilating purposes, it followed that the draught would be from the colder passage into the class-room, and directly out of doors by the open window, provided other circumstances favoured. There were ventilating apertures in the lobby which admitted air, but not abundantly. A north and a north-east wind would provide that the current should be from a north louvre in the latrines to the class-room. This was shown to be the case by burning brown paper, and noting the course taken by the smoke. A meteorological study revealed the fact that a few days before the dates I have mentioned the wind always happened to be from the east, north-east, or north. It appeared, therefore, that some fault probably existed in these parts of the premises, but the closest examination by flushing, by ocular demonstration of the clearest kind, showed that it was apparently impossible to connect the outbreak with this portion of the premises. The communication with the sewer was clearly indirect only, and the best possible means of ventilation was provided for the protection of every trap which was between the bath, or latrine, or closet and the sewer. I might have given up the search in this direction, but I discovered, almost by accident, that separated from the boy's closets, and leading out of the latrines, was a water-closet which was locked up; it had been provided for the tutors, but was seldom used. An examination of this water-closet gave a most perceptible evidence of sewer smell, especially when a large volume of water had been discharged down the latrines. It was quite clear that whenever the latrines were flushed, or the bath emptied, some part of the sewer became a closed receiver, and emptied foul air from the main sewer into the latrines by this water-closet, and from thence into the class-room. The closet discharged by a separate drain into the main sewer, neither the soil-pipe or the drain were ventilated, and seldom being used it is probable that the trap was altogether inoperative, so that a current of air was clearly capable of setting in from the sewer into the house. We have only now to provide that some of the factors of scarlatina shall be in the sewer for them to find their way into the class-room in the manner indicated. It was found on further inquiry that this sewer was in direct communication with the principal Blackheath sewer, for which no general ventilation was provided by the Local Authority, and that when the disease appeared in the school it was very prevalent in the district lower down the hill, and that every convenient arrangement was made for bringing some of the factors of the disease into the midst of the boys. Can we doubt as to the causation in this case, especially as I am informed by the principal that since 1874 no succession of cases has appeared at all in the school, and that the one imported case has not been followed by any general outbreak? The water-closet was taken away altogether, a clear space in the open air was kept between the latrines and the lobby; and I understand that the boys have been perfectly healthy since the last outbreak in 1874.

The third set of cases to which I will call attention also occurred at Blackheath, at the top of the Heath, close to the point at which the old Dover Road joins with the Shooter's Hill Road, on an estate called the Bowater Estate. It is covered with small houses, and is thickly peopled. At the highest part of the Estate are built the Elementary Schools belonging to the Parish of St. John's. A serious epidemic of scarlatina made itself felt in this school in the early part of September 1880, which led to the school being closed at the instigation of the Local Authority on the 24th of that month. The severity of this epidemic was undoubted; the first case appeared on September 2nd, seventy-five cases in all occurred, in thirty different families, and there were fourteen deaths. The last case was reported on November 2nd, so that its incidence extended over a period of more than two months, and it continued to be severe for a long time after the school was closed, which was nearly three weeks from the appearance of the first case, but it manifested its power for nearly six weeks after the means by which it was supposed that infection was propagated was put a stop to. The mortality in this epidemic was excessive, especially when compared with the others to which I have alluded, and the greater one to which I shall next draw your attention. In this case the mortality was at the rate of 18.5 per cent. I have always held that the mortality of scarlatina is caused more by the nature of the blood which receives the prime factor than by the character of the factor itself, though I do not mean to assert that some germs of disease may not be more virulent than others, just as the seeds of some plants, such as cinchona, are more vigorous than others of the same kind, and are more able to provide a larger quantity of quinine in the tissue of the plant, but if the soil into which the germs find entrance be unfitted for its reception, its greater infectivity will not find a field for the manifestation of its power. In this case it appeared most conclusively to me that the soil into which the poison germ was projected was eminently fitted to force it with fatal activity. The bodies of the children affected were prone to take on the disease, and to give it an unusual intensity, and I think I may safely infer that this proneness arose from the insanitary surroundings among which they were placed. The problem in this case was to determine why the surroundings were such as made the children prone to take on the disease, and then to find out by what channel the prime factors or zymotic agents which set up the disease were distributed, for I hold to the opinion that there is a dual requirement for the production of fatal enthetic disease,—a fitting soil as well as a potent disease germ. If you will turn to page 369 of Vol. IX of the SANITARY RECORD, you will find described the 'Fever Nest of Blackheath,' by a special commissioner of that journal. The writer describes a block of about 140 houses, containing from 800 to 1,000 persons. The commissioner reports that the sanitary condition of this district is most unsatisfactory, and he gives very distinct evidence, which must convince all readers, that the top of a hill may be made a pest house, even in this the latter half of the nineteenth century; for all these houses have been erected comparatively recently. It is in that block of buildings described in the SANITARY RECORD that the largest portion of the affected children resided. Suffice it to say that many of the houses were occupied by no less than three families, with several children belonging to each. But there is still another problem to solve, for

ity-five cases which arose in this district, seventy- attended the school, whilst a great many ren who did not attend the school, and many of n lived in the same houses, and even mixed the affected children, did not take on the com- t. There was no power to isolate, and scarcely to disinfect, yet the disease was limited in its ence to those families who attended the school iestion. It appeared that some condition which nged to the children who had attended the school not pertain in the others, for it was not only in chool that disease germs must have been distri- d, but elsewhere, for although the school was d on September 24th, the continuance of fresh s went on until November 2nd. We have to ask, fore, why the disease did not cease to extend after the school had been closed, for it is rally held that the stage of incubation in scarla- does not exceed a week, or if it continued to id among the residents by personal contact, why vages were absolutely restricted to children who attended the school, especially when we reflect the insanitary surroundings of the district . Inquiry showed that the incidence of the se was greatest among the infants. There were a ases among the girls, but only one or two of the ger boys suffered at all from it. I made most inquiry on all the points by means of which lisease might have been distributed. Water, and other articles, were all examined, only to ut aside as impossible vehicles, and one was ually led up to the school-house for a solution. surroundings of the school-house had been com- ed of by the managers, and with reason; but the ence of the disease was such as removed the sheds and market-gardens which abutted on two of the school, and which were pointed out as ble causes, from the list of factors.

examination of the drains belonging to the ol-house gave a partial solution of the difficulty. closets for the infants and girls were near to the e of the block of buildings which constitute the ol premises; they were entirely enclosed, and lated into the infants' school-room, and also, gh less completely, into the girls' department, it that of the boys was quite detached and out-

When the floor of the infants' school-room, r which the drain-pipe passed, were removed, the nctive sewage odour that came from the subsoil ath was very manifest; it was present in the ground e time of my visit, a week after it had been opened. re was conclusive evidence of sewage contamina- which was not made by escape of liquid sewage, nust have been altogether caused by sewage air. conclusion was not arrived at in any early stage inquiry, but, though a manifest one, it was to by leading up to it, and by the exclusion of other possible cause. I came to the conclusion e fault in the construction of the sewer system I am about to detail to you was the foundation epidemic.

tained from the representative of the Local ity (who kindly gave me every information) a of the sewers of the district. By this I found e Bowater Estate was at the top of a main hich passed down the old Dover Road, and ly discharged into the outfall sewer in the d Lower Road, about a mile and a half This is a sewer 11 ft. 6 in. in diameter, a fall of 2 ft. per mile, and acting as an d cesspool for the great pumping station at ss. The fall from the Bowater Estate to the outfall sewer is 126 ft. It is 1 in 68 at its junction with the main sewer, 1 in 72 in the old Dover Road, and falling to 1 in 150 and 1 in 229 on the Estate. Thus we have a very rapid fall at the origin in the main sewer, but scarcely any in the bye streets and places at which the sewage is poured into it. The sewers were 12-in. pipes, discharging into 15-in., and enlarging as they passed down the hill. The outfall sewer in dry weather is generally one-third full, but in heavy rains it is full to the crown, and I am informed that sometimes the side-entrance covers are blown up by the sewage. Be it as it may, it is quite certain that the outlet into the main sewer is frequently trapped by the sewage when the main sewer is full and much sewage is running down, whilst, when there is no rain and less sewage, but more gaseous products, these latter can get up the flue which has been inserted in this part, ostensibly to carry down the sewage from above, but also to convey air from below to the regions on the top of the hill. As the level of the sewage rises in the outfall sewer, a current must pass up the flue, whilst if it be trapped below, and sewage is coming down, it is certain that any air in the sewer must be driven out somewhere above. I was informed by the representative of the Local Authority that there were no ventilating openings of any kind upon the public sewer, from its junction with the outfall sewer in the Lower Deptford Road to its termination a short distance above and beyond the school-house. I made very careful inquiry at the four or five houses which join the sewer at the top of the blind termination in the old Dover Road, but could not find any evidence of escape of sewer air at these houses; it was seen also that the sewer being deep in the road at that place, those junctions were at a lower level than at the school-house, where the sewer came nearer to the surface. It follows, therefore, that the highest point upon this mile and a half of closed receiver was at the school-house. It may be in the recollection of the Society that the latter part of the summer of 1880 was very hot and dry. The complaints of smells from badly-constructed sewers was very general in all parts of London. I could not, however, find that any general complaint had been made of sewer smells from the street gullies in this neighbourhood. They appeared to be well constructed, one or two of them were said to have smelt at the top of Bowater Place, but I could not get definite information which would show that they had generally allowed sewer air to escape into the atmosphere of the neighbourhood. But in the school-house it was different; in that place was the distinctive odour of sewage. The iron rain-water pipes which were placed in the yard close to the doors of the school-room gave evidence of direct discharge of gaseous products by their state of oxidation, which was excessive at their junctions. They were fixed in a small yard within the walls, and any air escaping would most certainly be diffused into the school-room as much as elsewhere. These rain-water pipes would be untrapped by the dry weather; and besides, the water-closets provided for the infants were scarcely trapped at all. It seemed to be clear that as no provision was made anywhere for the discharge of gaseous products, by the Local Authority and as I could not find any evidence of private ventilation in that neighbourhood, the major part of the products of decomposition found their way into the infant school-house and the little yard adjoining, from the comparatively flat sewers. The very hot August of 1880 was most favourable to decomposition, whilst the small fall in the side streets on the Bowater

Estate, together with the short supply of water provided for the people, placed the house-drains and street sewers in the most favourable position for such products to be forthcoming. All things, therefore, conspired to send a supply of impure air among the little children, who for other reasons would be least able to stand against its influence.

It appears that the first case which arose among the children was an imported one, and was strictly isolated as soon as it was known that the child had scarlatina. But the sewer into which the excretion of this child passed was at the top of a street called Lisbon Street, and in its passage down to the main drain would infect every portion of the Bowater drains. This case was detected on September 2nd; on the 5th two other cases appeared in the same street; about this time were some heavy rainfalls, the sewage was stirred up more effectively than had been the case for some weeks, and on the 9th the epidemic began, five cases appearing on that day, and then a considerable number in succession, until the school was closed on the 24th. There was immediately a lull in the cases in new houses for eight days, when fresh cases began and continued to crop up all through the month of October. Now if the school-house had been the source of mischief alone, it ought to have ceased soon after its closing, but in reality the major portion of the cases were reported to have arisen more than a week after the school was closed. It is clear, therefore, that infection was spread elsewhere than at the school. This was not far to seek, as I saw children who had suffered from the disease playing together in the street with others who were not affected, but who might be so if they were sensitive to its influence. I have said that the larger portion of the cases occurred after the school was closed, but that in spite of the fact of the children being mixed up together, there being several instances of children of different families living in the same house, no child who did not go to the school was affected, and of those who did go, the boys altogether escaped. It is clear that the children who suffered from its incidence, and were more prone to take on the infection, were those who had been exposed to sewer effusions in the infant school-house and yard—these were the infants and girls, and they only suffered.

The constitutions of these children had imbibed a matter from the sewer air which allowed the scarlatina germ to fructify, which state did not present itself in the boys, neither was it present in any of the other children of the neighbourhood. For it happened, perhaps in consequence of the article in the SANITARY RECORD, or for some other reason, that in no one case in which the disease arose on the Bowater Estate was there any communication with the interior of the houses and the house-drains. The water-closets were all outside (except at the school-house); the sinks had no direct communication, but discharged on trapped gratings outside; and the overflow from the cisterns which supplied the people with water also discharged on to the same place, with the stack-pipes for the rain-water; so that there was no possible way by which these poor people could be soaked with sewer air except in the infant school-house and its appurtenances. I think it is clear that in this case the scarlatina infection was shorn of its infective character by these means. Insanitary surroundings alone, if unmixed with the products of decomposing sewage, and of its animal matter, may produce typhus and other fevers, but it is quite possible for persons to escape from the incidence of scarlatina, even when it is spread broadcast among the inhabitants. There were two cases which did not go to the school, one a mother who was nursing her children, and the other might have been imported. These exceptions seemed to prove the rule. I have not had opportunity of making inquiry since the date of my report, but at that time scarlatina had entirely disappeared from the neighbourhood of that Estate, and I conclude that it disappeared because all those liable to be affected had (and yet there were more than 200 children who had been exposed to it) escaped its ravages.

The fourth set of cases to which I will draw your attention occurred in the large pauper establishment for children which is at Anerley, which school contains about 900 children from 3 to 15 years of age. The disease was imported into that school in September 1880. Immediate and decided measures were taken by the highly-accomplished Medical Officer of the establishment to prevent its extension by isolation and disinfection, but in spite of every precaution and the most energetic action on the part of the officials the disease constantly re-appeared. The first case was a child belonging to the caretaker at the Infirmary, a building which is quite detached, and in everything separated from the school. In October there were three cases in the school, in November twelve cases were reported, the larger portion being at the end of the month. From that time the cases continued to occur more or less frequently, scarcely a week elapsing at any one time without fresh developments. The disease restricted its ravages to the young children; from September 29th, 1880, to May 14th, 1881, 37 per cent. of all the infants were affected by it, and 9 per cent. of the boys, and 9 per cent. of the girls, the total number of the cases were 108 in all, with three deaths, these latter being caused by complications, and not by the severity of the disease. Of the whole number only three girls and five boys over twelve years of age were affected.

The disease extended in the first instance from the infirmary to the infant house; the reason for this extension was not manifest, for isolation between the infirmary and the school was presumed to be rigorous. The boys were affected at the end of November, but the girls were not reached until the end of December. How or why this extension arose could not be made out, for the isolation between each set is distinct, except by officials and the senior children, who were not affected. The distribution of the cases was extremely irregular, no dormitory escaped, whilst no particular dormitory suffered more than another, and there was no regularity except in the fact that it was restricted to the young children, and that none of the officials or the servants suffered from it. The cause was not in the dormitories; it was not in the beds, for there was no alliance between the cases and the beds which any previous case might have occupied. Personal infection from case to case could not be the reason why it continued in the school. The energetic measures taken by the medical officers and the Superintendent were such as rendered the continuance of the disease from personal infection almost a matter of impossibility.

I made my first inspection on April 30th. I inquired into all the agencies which are generally found to be connected with the spread of similar outbreaks elsewhere; the milk, the water, and other articles of food, were inquired into, only to be put aside as improbable. A consideration of the drainage arrangements of the establishment seemed, at first

sight, unlikely to give any clue, for the details of the drains, as far as the school-houses and the Infirmary were concerned, were of the most superior order; but, a more careful inquiry and personal inspection of the whole of the sewer system under different conditions, and at different times, satisfied me that there was a blot in the arrangements which was intimately associated with the continuance of the epidemic. The whole of the sewers of the school discharged into a 12-in. pipe, which loses in the public sewer in the Anerley Road. There is a manhole and a ventilator within the grounds, just previous to its junction with the public sewer. This manhole was covered by a closed lid, but had recently had an opening made at right angles, and which would assist to ventilate the sewer. When the lid was closed, and before the ventilator in question had been made, it was clear that foul air did pass from the public sewer into the school sewer, whenever the wind was in the right direction and a fall in the barometer took place. From this main sewer branches pass at right angles towards the different blocks which constitute the school buildings. A careful examination of these drains showed that they were sanitarily perfect, as far as the main buildings were concerned, every junction with the sewer was carried outside and made a connection with the buildings in an indirect manner, whilst all the soil-pipes of the water-closets were properly ventilated. Further inspection was rendered difficult from the absence of man-holes, but when these were made, and the sewer opened at points behind and beyond the school, it was clear that whilst the living rooms and the dormitories were properly protected by an efficient sewer ventilation, the branches which crossed the play-grounds to the lavatories and the urinals, to some of the water-closets, and the laundries and baths, were not so protected. The proof of the effect of this was shown at an opening which had been made in the sewer behind the farm buildings. A ventilator inserted at this point gave very marked evidence of the escape of sewer air, which but for this new opening must have made its way out in the neighbourhood of the infant urinals and play-grounds. A second ventilator was inserted near to the infants' closets, and even more noisome gases escaped at this point, but the first ventilator inserted behind the farm-buildings ceased to be offensive. An opening was also made into the sewer behind the infirmary, and from this an offensive smell was perceived. There was also a circulation of air in the sewer between the infirmary and the infant house, though on a different line, both discharging a long distance below into the same greater sewer. This was made manifest by pouring down some peppermint as spray into the infirmary sewer; it was distinctly perceived at the new ventilator over the urinals at the infant house, when flushing by means of the great bath was in operation and the lower end of the sewer flooded. We know how scarlatina gained admission to the infirmary. The washings and excreta of the patients naturally found admission to the sewer, and I proved that there was a current up the sewer sometimes. It was the custom to flush the sewer by means of the great bath of 60,000 gallons of water every week, this flushing, however, flooded the lower sewer and prevented sewage coming down from the lines above, but did not flush the major portion of the system or prevent air from passing up the channels. A heading-back took place, and whilst this heading-back did occur, the hot water from the laundries and hot-baths was discharged into these closed receivers, with the inevitable result, that the warm water would assist to develop the scarlatina poison more distinctly, whilst it also caused a dilation of the atmosphere of the sewers, and led these matters to discharge themselves at the urinals and also at the gullies in the play-yards, around which it was usual for the little children to congregate, as I had frequent ocular demonstration. This occasional discharge of hot-water into the sewers raised the temperature of the contents of the sewer. There cannot be any doubt but that these conditions tended to cause a more rapid development of gaseous products, and this occasional discharge was also attended by the continuous discharge of waste-water from the condensing engine into a sewer, which was not provided with any ventilating opening, and which, when it became cool, and the steam in it was also condensed, must have got its supply of air from the sewer below, and into that sewer there was a continuous discharge of infecting excreta from the new cases which constantly developed themselves.

I need not go into all the points of detail which were considered in my Report to the school authority: suffice it to say that with the insertion of the ventilating shafts there was an immediate cessation of cases, except such as were explainable, and as an epidemic it altogether ceased on the 14th of May, or within a fortnight of the insertion of the shafts. The points of interest in this case were:—The mildness of the attacks as compared with those in the St. John's School at Blackheath; in the one case 14 deaths arose among 75 children, or 18.5 per cent.; in the other 3 deaths out of 108, or scarcely more than 2.7 per cent. In the one case the children lived for some hours in an impure atmosphere, and were badly cared for at home; in the other the surroundings were quite healthy. In many of the cases at Anerley there was scarcely any fever at all, sometimes only the rash developing and showing its nature, and the distinctive throat affection was not severe. The desquamation was considerable in some cases. The majority were removed from the school as fast as they arose, either to the Croydon Infectious Hospital or to the Stockwell Fever Hospital. A few had anasarca, and a few had rheumatism; whilst in those at Blackheath the cases were severe to start with, the glands rapidly affected, and anasarca afterwards very common. I had opportunities of seeing some of the cases at Anerley, and some of the convalescents at Blackheath, and I am satisfied as to the correct diagnosis of the disease.

What inference do I draw from these cases? It is, that the causation of scarlatina may as often arise from sewage emanations and sewage contaminated with the scarlatina germs, as from personal contact; and whilst such contact can undoubtedly spread the disease, there is less danger to be apprehended from this cause, if isolation and disinfection are definite and properly performed. I have been in the habit, now for many years, of thoroughly disinfecting my patients by proper baths and a ten days' quarantine, and not even waiting in every case until desquamation is complete, before the patient has been allowed to mix with his fellows, provided there has been no ulceration or any discharging surface upon the skin. This has been done on very many occasions, and in no one instance have I had cause to regret the course taken, though the individuals have been sometimes marked persons, and I should have heard most loudly if any mischief had arisen from my advice. It is far more important for the interests of the public that the excreta should be

thoroughly disinfected, and the sewers properly cleansed and ventilation provided, than for a continuous isolation of a case, because the skin is a long time exfoliating. I saw, only the other day, a lady who was kept six weeks in a top attic, because there was exfoliating skin, an exfoliation which was kept up by the Condy's fluids and other disinfectants, more than by any remains of scarlatina infection. The health of the patient was suffering by this confinement, with no real advantage to anybody. I wish also, in conclusion, to point to the great danger which arises from the discharge of hot water and waste from steam engines into sewers. I do not know how it is to be prevented, but I have on several occasions had reason to connect outbreaks of diphtheria with this cause; and I would suggest to my medical brethren, that the positions of these dischargers should be noted on the maps of the sewers, which latter ought to be kept in the office of every Medical Officer of Health; and I cannot but think that many of those cases of scarlatina which so bother us as to their causation, are due to an accidental inhalation of air from some open grating over one of our badly constructed sewers, or from some other decomposing animal matter which abounds all around us, such as the unhealthy blood of vertebrate animals, than from personal contact. Of this I am certain, that those who are exposed to have the atmosphere they habitually breathe contaminated by such exhalation, are certain to suffer much more severely from the disease in question than those who are not exposed to any such influence, and that this fact will explain the reason why the disease is severe in one case and mild in another.

THE SINS OF THE PLUMBER.

By W. K. BURTON,
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II.—STRUCTURAL SINS.

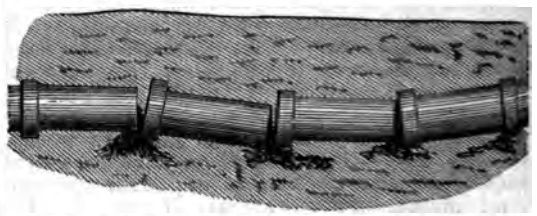
DRAINS.

IN enumerating and describing specific faults in drainage and plumbing work which have come under my notice, I would begin at one end of the system, and taking each part by itself, give what experience I have of the structural sins which have been committed in connection with it.

To begin then at the sewer end and to take the drain. Unless we intend to enter into the history of the subject, we need scarcely consider the brick drain or elongated cesspool, which until comparatively recent years was the one generally laid under our houses. It exhibits almost every fault that a drain can have, besides being far more expensive to construct than a pipe drain, and I think I am not wrong in saying that the most behind-hand builder would not think of laying such a drain under a modern house. I pass on then to pipe drains. The faults to be found in these divide themselves into two classes, first, those which lead to leakage from the pipes; and, second, those which lead to obstruction or choking of the pipes or the formation of deposit in them.

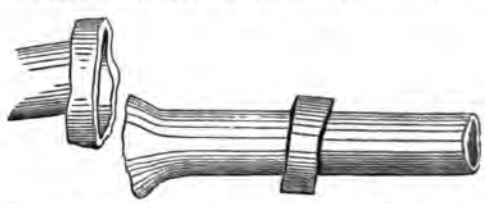
As regards the first—the leakage—I believe I do not in any way exaggerate the defective state in which it is common to lay drains, when I say that not one per cent. of those under the houses of London would stand the test of being closed at the sewer end and of being filled with water. A leakage greater or less would be found in almost every one, and very often such a leakage as would make it impossible to fill the drain at all. This being the case, we are brought face to face with two alternatives. Either, practically, every house in London should have its drain unreservedly condemned, or a certain small amount of leakage must be allowed to pass. I do not propose to enter into the question as to what extent an inspector is justified in passing slight defects; but would point out that such faults as are small in extent, are almost universal, and are generally passed by inspectors, do not come strictly under the head of 'sins of the plumber'.

Far otherwise is it, however, with those graver errors, which are very common, and which lead to an appreciable proportion of the sewage matter of the house being deposited in the soil under the basement. It is no uncommon thing to see, on digging down to a drain, that it has been laid with no material whatever in the joints. The usual procedure in laying such a drain is to dig a trench along the course which the pipes have to follow, and almost literally



to 'chuck' them into it. Sometimes, too, the pipes which are used by the kind of man who lays a drain in this style, are what are called 'seconds', that is to say, the pipes themselves are defective—either cracked or oval in section. When a drain is laid in this manner, it often happens that the whole of the liquid part of the sewage leaks out of it.

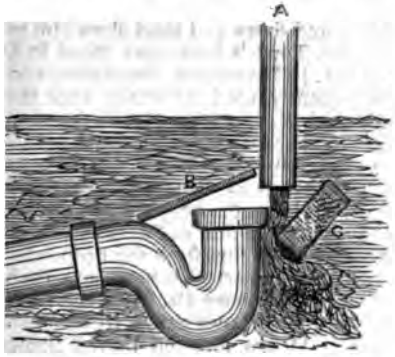
Next to this excessive case, then comes the one where *clay* is used in jointing drain pipes. And here let me say that I believe that a thoroughly good drain *can* be made with clay joints, one which will be quite water- and gas-tight, and which will remain so for an indefinite time; but this requires certain peculiarities of soil and probably more trouble than it would take to joint with cement. As a rule, clay-jointed drains are to be condemned. They will probably remain tight for a certain length of time, after which the clay will gradually be washed out and leakage will occur. Another very common fault is to be found in the careless making of cement joints. In extreme cases an apparently neat job has been made of the upper part of the joint, but on passing the hand under the collar of the pipe, it is found that there is no cement there at all. This is, however, not common; but minor defects which permit a very considerable leakage *are* common. Defective pipes are frequently found in drains, that is, pipes which are cracked or completely broken, and I have seen a case where the socket was completely removed from



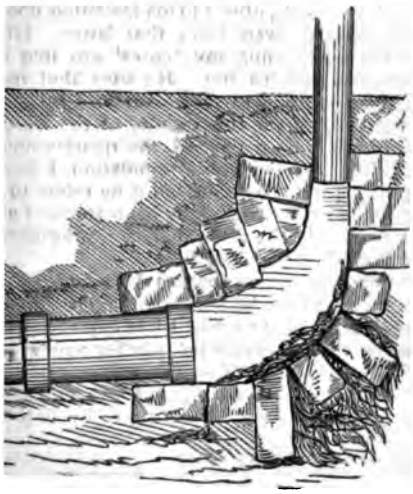
a pipe and where the pipe next it was deflected several inches to one side something like this. Such defects

ure, I believe, far more often due to after-
t of the drain than to pipes which have
ctive at first, and are greatly caused by the
g nature of the material used in making the
consider that a far better material than
s to be found in a properly proportioned
f tar, pitch, and sulphur, which may be used
the same way as cement or with a ring of
n. Sometime ago Mr. Cosmo Innes ex-
ed to a considerable extent with such a
ion, and several drains were laid very success-
it. It makes a very tight and very elastic
reat difficulty is, however, experienced in
g workmen to go so far out of their usual
to use it.

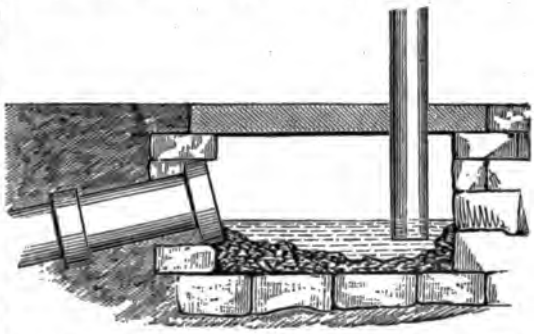
I have been considering the straight part of
, but it is most commonly at the junctions,
of all at the junctions with vertical pipes,
oil pipes, that faults are to be found. I have
y seen a drain which had been laid com-
well through the straight portion, which
ably carefully jointed, but in which all the
and bends were made up with bricks.
the builder had a stock of pipes, but had
or junction pieces and would not give him-
ouble to order them. Of course there was
akage besides deposit at the brick portions.
said, it is at the junction between the drain
oil-pipe that defect is most common, and I
sketches of a few of the connections, or



ections, which I have actually seen. The
case where the soil-pipe has 'missed' the



P-trap in which it was intended to join it, the others illustrate various ill-conditioned brick junctions.



So much for the defects leading to leakage. The next set of defects are those which lead to deposit in the drain, or even to complete stoppage—that is, to the conversion of the drain into a sort of elongated cesspool. The first of these is, as might be supposed, too little 'fall'. In other words, the fault lies in the drain being laid level or too nearly level. Perhaps I may surprise those who have had little experience of drainage work, when I say that the occurrence of a drain, which has from end to end too little fall, is rare. It is very common, indeed, to find a drain which has *portions* laid with too little fall, that is to say, which is irregularly laid, but it is not often that had the drain been laid uniformly from end to end it would not have cleared itself. It is irregularity of fall which most commonly of all leads to obstruction in drains. Often this only extends to two or three pipes, which are quite level or even, have a slight inclination the wrong way, but in extreme cases it is found that each pipe points in quite a different direction from the one before it. I illustrate a state of affairs which is by no means uncommon. A somewhat startling discovery resulting from the house inspection which I have done in London, is that at least six per cent. of the best houses in the town have their drains completely choked, and have the whole of the sewage soaking under the basements!

Next to the fault of irregularity of fall comes one which is even more common, but which I have not put first as it does not usually lead to actual stoppage, but merely to accumulation of a certain amount of deposit. This is the 'burr' or 'rag' of cement which is so frequently allowed to project into the drain from the joint, and which ought in all cases to be removed before the next pipe is laid. When unaccompanied by irregularity of fall, it does not, except in extreme cases, lead to complete stoppage, but it greatly aids the tendency which either irregularity of, or too little, fall, has to choke a drain.

Excessive leakage is a very common cause of a stoppage. In such a case as that described above, in which imperfect pipes are imperfectly jointed, a stoppage is certain to take place if the drain be long enough, and no amount of fall will prevent it. As the quantity of water in the drain is decreased by leakage, its 'carrying power' is gradually diminished, until it is totally lost, and the solid material has nothing to bring it farther on. As a matter of course, it stops and chokes the drain. Imperfect junctions, such as those made with bricks, have already been mentioned as a common cause of deposit, and it may be said that any departure from the circular section of the drain, whether it be in the form of a brick junction, a dip-trap, or in whatever form it be,

will result in a greater or less amount of deposit. Right angled pipe junctions are to be avoided, although the amount of deposit caused by them is less than seems to be commonly supposed.

Too large-sized a drain must be considered among the faults tending to stoppage or deposit in drains. It is evident that there is a limit to the size of drain which any given amount of water will flush, and that the smaller the drain the better the given amount of water will flush it. Now as the quantity of water which comes from a single house is always comparatively small, and is never greater than will be carried off by the smallest pipe which is large enough to allow the solid material to pass, the only factor which needs to be taken into consideration in determining the diameter which requires to be given to a house-drain is the question of what size is necessary to pass the solid material. A 6-inch pipe is amply sufficient. Even a 4-inch pipe may do, but this size allows so small a margin that the slightest imperfection may lead to a stoppage. On the whole, I could not recommend the general adoption of 4-inch house-drains. I believe that five inches would be the best size of all, but it is impossible at the present time to get 5-inch pipes with all fittings, and so we have to settle down to 6-inch, which certainly is a very good size. There is no point which the modern 'drain man' has been so slow to pick up as this—that, within limits, a small drain is better than a large one. If you go with him over a small house which he has just drained, he will explain with the greatest pride, and evidently under the impression that he could not give higher praise to his work, 'The drain is a 9-inch pipe, Sir; no cheap 6-inch work for me!'

I mentioned in my first communication that the fixing of a common syphon trap on a drain is a frequent cause of stoppage. A short time ago I was called in to examine a case where the ground under the basement of a house was completely saturated with sewage. It was found that the drainage of five or six houses was carried under this one, or rather, was deposited under it, the drain being a 12-inch pipe. Immediately beyond the house, a 9-inch syphon had been fixed on the drain. Now it need not be supposed that the 9-inch syphon on the 12-inch pipe was necessarily a vicious arrangement. On the contrary, it might have been a very good one. The 12-inch drain was far too large, and had the 9-inch syphon been connected to it by a tapered reducing piece, it would have been more likely to clear itself than if it had been a 12-inch syphon. No tapered piece had been used, however, but the joint had been made up with pieces of brick and clay, and, as a natural result, a complete stoppage occurred. On the perpetrator of this piece of work being questioned, he frankly stated that '12-inch syphons were difficult to get, and he had not had a tapered reducing piece in stock!' Heavy flap traps, fixed at the end of drains with only a moderate fall, frequently cause deposit.

The Board of Health of Flushing, U.S.A., recently passed an ordinance requiring all the people of the town to be vaccinated within ten days, unless a regular physician declared it unnecessary. Any person who refused to comply with the ordinance was declared to be guilty of a misdemeanour. In consequence of the ordinance the people of Flushing have been undergoing wholesale vaccination, all doubt as to the power of the Board to enforce such an ordinance being surrendered, in view of its advantage to the health of the town.

SMALL-POX HOSPITALS AND SMALL-POX.

By JOHN W. TRIPE, M.D.,
Medical Officer of Health for the Hackney District; President of the Society of Medical Officers of Health.

DR. COLLIE'S paper on 'Small-pox Hospitals and Small-pox', published in the SANITARY RECORD for February 15, is so evidently a piece of special pleading, that I would not have replied to it if my personal feelings alone were consulted, but as the interests of the public, and especially of those who reside in the vicinity of the Homerton Small-pox Hospital, are concerned, I feel myself necessitated to reply. As regards Dr. Collie's contention that his use of the word 'relatively' is correct, I assert that it is utterly misleading when coupled with the words 'epidemic-free years', as I repeat that in 1861-70 the mortality from small-pox in London was 28, and in 1871-80 46, per 100,000 population. If Dr. Collie considers that the difference between 46 and 28 deaths per million population, constitutes the latter a 'relatively epidemic-free period', whilst the former is admitted by all to have been a frightfully epidemic period, I desire to say no more on that head.

Dr. Collie next states 'that Dr. Turtle has established the fact that small-pox did exist in the vicinity of the hospital when it was closed, and during the time in which Dr. Tripe said there was not a single case in the vicinity of the hospital until six weeks after it was opened.' Dr. Collie, here, is as lax in his statements and dates as I shall show him to be in his figures. Dr. Turtle's letter was dated in October, I asserted that in November, December, and January, and subsequently, until six weeks after the hospital was reopened, there was no case in the vicinity of the hospital. The case of Curtis, in Brooksby's Walk, was contracted in all human probability from a succession of cases at 45, Brooksby's Walk, which commenced just before the hospital was closed, and was attributed by the mother of the family, who first took the disease, to infection from the hospital.

Dr. Collie commences his next paragraph with the words 'Let us now hear Dr. Tripe himself', and then proceeds to quote a letter or report, which commences as follows:—'I am directed by the Sanitary Committee for the Hackney district to express,' etc. Now, no one knows better than Dr. Collie that if an officer is directed to do a thing, he is to do it, but that he is not to be held responsible for any act thus performed. I must, therefore, object to his fastening upon me any conclusions derived from that letter. Dr. Collie's remarks concerning my 'cases' are like his other statements—misleading. He says that more cases would be reported to me (I suppose he means proportionately) from the vicinity of the hospital than from other places beyond the quarter-mile radius. If he includes the whole population, I have already stated this to be the fact, but if he refers to the other 30,000 poor persons, I deny his statement altogether, as I have only the same means of information in the one as in the other localities.

I now propose to discuss Dr. Collie's figures and statements which he brings forward in opposition to mine. Dr. Collie says—'I had no conception when I wrote my observations how far wrong they really were, and how groundless were the conclusions which Dr. Tripe had arrived at. As a specimen of one of the many blunders, let us take the following:—In the years 1861-70, says Dr. Tripe, the deaths per 100,000 inhabitants in London were 28 as against 17 in Hackney; whereas in the Appendix of the

sent to the Asylums Board managers, the ire 17 and 28 per 1,000; and neither the 1,000 100,000 is correct. So in the years 1871-80, h-rate in Hackney is said to be 64 per 100,000, which are wrong.' Now Dr. Collie knows l that the '1,000' was a clerical error (not ır 100,000, and that this error was altered in ıbsequently sent to the Committee of Manage- the Small-pox Hospital. The figures, as d for London, are correct if based upon the urns which I had, viz., those of the Registrar- . There was an error made by the Registrar- in calculating the population of London, as unknown at the time I wrote the Appendix. rds the 64 for Hackney, that is correct if the ay of calculating be observed, viz., to group all the deaths in the ten years and divide nean population. If corrections be made for r of the Registrar-General, and the mortality all-pox in Hackney be calculated by dividing hs each year by the population on July 1st, ogether the numbers and dividing by 10, we instead of 64 for Hackney, and 45 in all which tell more strongly against Dr. Collie's ıt than the original figures.

ext matter I have to point out, is one of the :atistical blunders I have ever met with. lie states that my figures respecting the nortality in the vicinity of the hospital, and he quarter-mile radius, are entirely wrong, I have not taken into consideration the nts of the City of London Union, and the rsons who have passed through the Homerton lospital in the ten years. He then proceeds ıat if these be taken into account the results in the streets adjacent to the hospital 0.9, of 4.1 deaths per 1000 population per annum; he quarter-mile radius, 1.1 instead of 2.45, instead of 1.6 amongst 30,177 other persons in small houses. Now it is scarcely , but Dr. Collie has added on the whole of ıo persons to the main annual population the hospital, in order to obtain the mortality ım, as though the whole were residing at one the hospital grounds, or as if this (7,000) was age number of residents in the Fever Hos- ring the ten years. If we allow the average of residents in the Fever Hospital to have ıy 350, and the inhabitants in the City of Union at 650, for each of the ten years, ıe results to be as follows :—In the immediate of the Hospital 2.91, and in the quarter-mile 1.16; amongst the other 30,177 poor persons r 1000 population, showing even then 2.91 0.9, as asserted by Dr. Collie. I have also to n, that Dr. Collie has not taken into account ıerous cases of, and the deaths in the Fever l from, small-pox, which occurred among the ıtients. Dr. Collie brings these forward as of my numerous blunders; perhaps he will ıt some more.

st not be supposed that I consider it right to the residents of the Fever Hospital and the ndon Union in the population around the l, as it is evident that persons residing in s, and not mixing with infected persons, or ıe exposed to infection, are not likely to con- all-pox in the same proportion as those just ed. I therefore went into Dr. Collie's figures, that he cannot be depended upon for ıg my figures. Dr. Collie also infers that a natural affinity for small-pox in the neighbourhood of the hospital; I am not prepared to deny this, as I do not know in what the alleged affinity consists; but it is a fact, that since the hospital has been closed, and a few cases only admitted into a wing of the Fever Hospital, the affinity, as at former periods when the hospital was closed, has again ceased to be apparent. This is shown, by the almost complete cessation of cases there, whilst very many have occurred elsewhere in the district.

Dr. Collie denies that he said that the Small-pox Hospital at Homerton 'is constructed in such a manner, which, two years ago he would have said to be highly objectionable'. I will therefore state the facts as to the hospital, and quote Dr. Collie's opinion as to the requisites for such a hospital. The *windows* of the Small-pox Hospital are within 24 feet of the wall surrounding the grounds, and the wall abuts on a public footpath; the laundry is within ten feet of the wall, the spray (condensed steam) often comes into faces of the passers-by. The Medical Officer's residence, the steward's offices, and the stores, are all within the wall. Dr. Collie, in his paper on the 'Management of Small-pox Hospitals', says:—'It is on this account that I have come to the conclusion, that 100 feet would be a safe distance, and I do not think that in *any case* it should be much less (the Homerton hospital has only 24 feet). How I propose to utilise this 'separation space' or distance between the hospital wall and inhabited dwellings will appear by-and-by. That the hospital should be within the wall need not be said, *but it does need to be said, that nothing but the hospital, the patients, and their attendants, should be within it.* The steward's office and residence ought to be without the wall, so that visitors on hospital business, the tradesmen, and their servants, need not enter any part of the hospital proper.' The italics are mine, and I must leave unprejudiced persons to judge whether or not I am justified in saying, that the Homerton Small-pox Hospital is not erected on those principles which Dr. Collie says are alone safe.

Great improvements and additions have been recently completed in the drainage of Walthamstow, under the direction of Mr. G. B. Jerram, A.M.I.C.E. The defects in the sewerage were chiefly in the private streets. One of the principal works that have been executed consisted in providing sewers for draining Higham-hill, where before cesspools existed, which overflowed into the brook. The level of the main northern sewer was above that of the brook, and this has been got over by building a new culvert eight feet in width and four feet high, and raising the road some four feet six inches in height, thus making the approach to Higham-hill much easier and more convenient. The sewer recently laid is over six miles in length, and junction pipes are laid at intervals of thirty and forty feet, so as to avoid any necessity of breaking the sewers to make any connection therewith. The works have been executed by Messrs. Currall and Lewis, contractors, of Birmingham. The construction of the surface-water drains has prevented any flooding of the sewage farm during some recent extraordinary floods in the Lea Valley, thereby removing one of the causes of difference between the Local Board and their tenant.

M. Armand Gautier has made a series of analyses on the presence of lead in foods and liquids, and presented the results to the Paris Academie des Sciences. He finds lead in preserved fruit and vegetables packed in 'tin' boxes, a minute proportion being absorbed from the solder of the boxes. Prepared sardines, and particularly the oil in which they are packed, contain a still larger proportion, and the longer the sardines have been kept, the greater is the proportion of lead.

HINTS ON HOME SANITATION.

By H. H. COLLINS, F.R.I.B.A., F.I.S.

ALTHOUGH we cannot always select, yet we can all discriminate with regard to the amenities and surroundings of the locality of the house we intend occupying. Given a certain number of residences from which to determine, we may choose that one which from various reasons is the one most free from objections, and which possesses the fewest defects. For example, we may endeavour to avoid a too crowded locality—one surrounded by narrow and ill ventilated streets, alleys, or lanes, the devitalised air of which would be sure sooner or later to prejudice the one we are about taking. We may give the preference to a detached or a semi-detached house well bathed in air, to that of a terraced house, cribbed, cabined, and confined. We may choose between two sides of a street, so as to obtain the best aspect, say a south or south-westerly one in lieu of the other points of the compass. We may select a gravel, loamy, or well-drained subsoil in lieu of a damp, ill-drained clay one, and we may carefully refrain from dwelling in a house the foundations of which rest on fœtid débris or former dust receptacles. We can easily ascertain if illness has been prevalent in the locality. We can see if roads are made, and with what materials, and we can easily ascertain if the same have been 'taken to' by the parish, sewered, lighted, and supervised by competent responsible authority.

Before entering into the occupation of any house we may protect ourselves against the incalculable evils arising from bad drainage, or roofs not watertight, by obtaining a verbal or written assurance that the same are perfect and the house consequently fit for habitation. It would be advisable to secure such a guarantee in writing, or such assurance given in the presence of witnesses. Quoting from the judgment of Mr. Baron Pollock, it will be seen that if such assurance is given, ignorance or carelessness upon the part of the landlord will not excuse him. 'If persons take upon themselves to make assertions as to which they are ignorant, whether true or untrue, they must, in a civil point of view, be held as responsible as if they had asserted that which they knew to be untrue.' Mr. Justice Kay, in another judgment, said, 'Now what is enough in law to make a man liable for an action for deceit? It is enough that either he knew the statement he made was not accurate, or he made it recklessly, without having knowledge about it one way or the other.'

Lastly, with respect to exterior considerations, we should give the preference to that house which has the thickest walls, the greatest amount of light, and appears to be the most substantially constructed, carefully avoiding being led away by a showy exterior, however picturesque, or overlaid with (too often) meretricious ornament, for most of these so-called advantages are the means of retaining dampness, garnering filth and dirt, and preventing the escape and evaporation of the natural humidity of our climate.

The dust bin should not escape our notice; we should take care that it is so placed as not to prove a nuisance; properly ventilated and moved as much away as possible from any of the ingresses to the house; nothing but dust and ashes should be allowed to be placed in it—vegetable and matter liable to decay should be burnt each day.

* Read at the Brighton Health Congress, Dec. 1881.

The first consideration with regard to the interior of the house is its sanitary condition.

Assuming that its external drainage is guaranteed and perfect, we must carefully see that there does not exist any connection with the main sewage and the house proper. This is not difficult. See that the waste pipes from the sinks are open at their ends and pass outside; also that the overflow pipes from cisterns are similarly treated;* see that sinks are placed against external walls and under window openings. Ascertain the position of W.C.'s; if situated in the centre of the house, give the preference to that house where the conveniences are positioned against an external wall, and lighted and ventilated from the outside; recollect that W.C.'s off staircase landings are the best. Take care that the W.C.'s are supplied from a separate cistern, so that no communication exists between the drinking water cistern and themselves; this can easily and economically be effected by interposing a small waste-preventing cistern if it be necessary.

See that the soil pipes are of lead, and carried up their full bore above the roof, away from all windows or other ingresses to the house. It is an ordinary practice to make common light cast-iron rain water pipes serve both for soil and rain water; this should not be permitted, but if the landlord objects to substitute lead for iron, then take care that the joints of the iron pipe are thoroughly air and watertight, and that the pipe is carried up above the gutter as just mentioned, and a branch put in to take the rain water.

In any such arrangement it is essential that the soil pipe be exterior to the house. If possible, it is very desirable that an open trap, Potts' Edinburgh or Buchan's, should be inserted at the feet of these soil pipes.

Pan closets should be avoided; simple earthenware hopper closets are much preferable and more economical in first cost. If safes or trays are placed under W.C.'s, take care that the overflows therefrom pass direct into the open air.†

Ascertain the position of the cisterns; these should be accessible, so that they may be cleansed out frequently, as if placed in roofs, under stairs, or jammed into sculleries, they soon become neglected and sources of disease; all cisterns should be covered. All drinking water should be boiled and filtered, and if charcoal be employed as the filtering medium the same should be renewed at frequent intervals.‡

If the bath forms, as it should do, a portion of the fixtures, take care that its overflow and waste pipe discharge into the open air; and I should advise that means be taken to carefully shut off draughts by placing india-rubber seatings between the wood and metal work (the same observations apply to W.C.'s). Similar remarks apply to all fixed lavatories, slop sinks, &c., which should always be placed next external walls, and not in the centre of houses, where they are most productive of prejudicial effects.

Let your preference be for that house which has

* A simple plan for keeping waste and overflow pipes clean is to obtain a cane and bind round its end a piece of rag or sponge, wet the same and pass it up the pipe once or twice.

† The flap of the w.c. should be closed down every night, the door shut, and the window slightly opened, and once or twice a week the basins washed out with dilute spirits of salt. There exists no reason why the basins of the w.c.'s should not be as clean and the water as pellucid as that of a drinking fountain.

‡ Several filters worthy of attention are to be found in the Exhibition, notably the Carferal and Maignen's 'Filtre Rapide'.

litude of light, is free from dark and unven-
passages ;—cupboards, closed dressers, nooks
rners are not always the conveniences they
to be ; they form, as a rule, receptacles for
neglected dirt of a house to congregate in,
: fruitful sources of danger ; every housewife
:ognise that by exposing to the full light of
e pots, pans, and household requisites, she
better able to preserve them clean, and what
.lly necessary, whole, unbroken, and fit for

:r use as a bed-chamber an apartment with-
re-place, for here it is that 'the death of each
fe' occurs when vitality requires all the as-
e which can be afforded to it. Ventilation is
importance to the hygiene of house and
nt.

d yourself against the inconvenience and
nce of smoky chimneys by special agreement
ur landlord, but a smoky chimney is even
han having none at all.

nple and cheap means of obtaining ventilation
: draughts is the insertion of a board about
de between the bottom rail of the sash and
of the window ; but if you can obtain from
ndlord fire-places having hollow chambers
round same, so that in winter air may be ad-
in a warmed condition, and in summer in a
state, so much the better.

ve hitherto spoken of the admission of pure
it is equally, if not more, necessary to extract,
ast to allow egress of, the foul air. This can
ily obtained by means of Sheringham's venti-
Arnott's valves, and contrivances of a like
being inserted in the outer walls, or in special
r in the chimney breasts, and at very little
[t is very desirable that all halls and stair-
uring winter should be warmed ; a good gas
vill, if there be no other way, be a simple
of procuring this, but never adopt gas as a
medium without the stove or apparatus
ished with a flue to permit of the escape
mpure air ; nothing can be more dangerous
health than the neglect of this hint. Atten-
ould also be given to the state of the gas ser-
t should be examined and tested with a taper
f there be any escape.

egards the appropriation of rooms, of course
pends on the class of house, but as a matter
mon sense, and consequently of sanitation,
no difficulty in any class of house to select
aspects for each apartment, bearing in mind
pose for which they are to be devoted, thus :
ing-room, as probably the least used room in
se, may have a northerly aspect ; the sitting
awing-rooms, southerly and westerly ; the
s, westerly ; larders, etc., northerly ; nurseries,
e as sitting rooms, and so forth ; so that the
amount of health and enjoyment may be ex-
from even an ill-planned and ill-arranged
g.*

'hint' more with regard to the house and its
ings, worth all the rest ; do not imagine that
structure, drainage, water-supply, and the
appliances appertaining thereto are left in
condition that they will always remain so,
at, unlike every other production, they will
impaired for ever, or even that period of 'for
few years. If you desire health you must

work for and deserve it ; constant supervision, to ensure great and continual cleanliness, is essential ; you cannot 'nag' your domestics too much on this score, you cannot be too watchful, whether the house be large or small, whether it belongs to peer or peasant, if you wish to preserve it as a pure wholesome dwelling in which to live instead of to die.

First, as in all chemical operations, absolute cleanliness is required in pots, kettles, and utensils ; due weight, purity of concomitants, economy in their use. The meat weighed and washed ; the vegetables cleansed, salted, and soaked ; the fish carefully examined and well cleansed ; the cloths free from impurities ; the knives, spoons, etc., etc., clean and fit for use. Lastly, the result, a delicious meal, effected at half cost, productive of comfort and replete with health-giving properties.

I cannot conclude without calling your attention to one other matter of every-day but yet of equal importance with the other subjects to which I have directed your attention, namely, 'Clothing.'

Dr. Max von Pettenkofer, Professor of Hygiene at the University of Munich, writes : 'One of man's principal defensive weapons in his struggle for existence is his clothing ; the place it takes in the history of civilisation and its connection with physiology are not often thought of ; it is spoken of from a moral and æsthetic point of view ; its main purpose is a purely hygienic one.' He adds that 'the forgetfulness of this is to be deemed a great misfortune, inasmuch as small and frivolous considerations have subjected mankind to many ills, and have often acquired an ascendancy over better and fitter hygienic clothing.' The seeds of grave disorders and chronic illness are frequently—very frequently—propagated by the neglect of well known principles with regard to clothing. This is a large subject, and I would refer you to Pettenkofer's work, wherein you will find much instructive and interesting matter ; but I would mention that he calls attention to the fact that we generally consider clothing as an apparatus for keeping air from us, whilst in truth we could not bear any garments which did not allow of a continual ventilation of our surface.

It is therefore necessary that we should make ourselves acquainted with those textures which, being most permeable, afford us the warmest clothing. It is not the densest, thickest, or heaviest material which is best suited for our purpose. My 'hint' on this head is that, as our health is so intimately associated with the economy of our dress, you should begin to think for yourselves with regard to it ; emancipate yourselves from the tyrannical dominion of fashion, and study to obtain a deeper insight into those laws of clothing which will inevitably tend to increase the longevity of the community and to enhance its comfort and enjoyment.

There is, as I have said, a host of other subjects connected with Domestic Sanitation, such as those relating to furniture, etc. On this head I would 'hint' at the desirability of taking care that it should be of such form and character as to prevent the lodgment of dirt and dust ; all hollows should be filled in, and all unnecessary ornamental projections dispensed with ; under any and all circumstances a continual application of elbow grease is very advisable.

Too much caution cannot be exercised with regard to various matters external to the house, but often productive of serious consequences internally, such as the selection of the laundress, charwoman, seamstress, tailor, etc. It is a 'hint' worth attention if

int' as to paper-hangings will not be amiss ; take care that not arsenical in colour and composition.

the lady of the house would visit, or at least ascertain the character and surroundings of the homes and workshops belonging to these people before availing herself of their services; good in countless ways would result from such knowledge.

The laws of the Old Testament embraced every matter upon which I have lightly dwelt—household, dietary, personal, sumptuary—and every conceivable sanitary question affecting the happiness and life of mankind. Explained and amplified by the savants of the Jewish race they have acted as their guiding star for over 5,000 years and have preserved them in health under unexampled difficulties up to the present day.

Dr. Richardson thus writes:—'Facts show that from some cause or causes this race presents an endurance against disease that does not belong to other portions of the civilised communities. The resistance to those influences which tend to shorten the natural cycle of life is singularly instructive.' He gives statistics which show that amongst infant mortality 10 per cent. die amongst the Jews, and amongst other denominations 14 per cent. That the average duration of the life of the Jew is 48, of others only 36. That a quarter of the Jews live beyond 71 years, and of others 59 years and 10 months. That the extracts from the civil state papers of Prussia show a mortality of the Jew 1.61 per cent., as against the mortality of the whole kingdom of 2.62. That the annual increase of the Jews is as 1.73 to 1.36 amongst other denominations. He adds, the Jews escape great epidemics more readily than other races. The mortality of cholera, for instance, was so slight that the fact of its existence was even disputed.

He attributes the main causes to what he calls 'soberness of life', thus interpreted by him—sobriety, better food, carefulness in the rearing of children, thoughtfulness for their aged and infirm, general care of their poor and also of themselves. Whilst in no way disputing the conclusions which Dr. Richardson has arrived at, I venture to assert that most of these beneficial effects have been the results of continuous and unremitting attention to the sanitary and hygienic laws laid down by Moses and amplified by his disciples—Laws which, for the first time in the history of the world, proclaimed that 'Prevention was better than cure'—that the real science of Medicine lay in the direction of prophylactic rather than therapeutic measures; that by the laws he laid down—not as a monopoly for Jews alone but open to all who desired to live by them; admittedly onerous but undeniably efficient—he not only prevented disease, but if unhappily it arose, he took all those measures which modern Science has revived, to stamp it out.

The Commissioners of Hove, Brighton, have been proceeding against a number of speculative builders. In one case a large party-wall had collapsed, and in several other walls there were spaces of three inches between brick and brick filled in with mortar, which contained less than one per cent. of lime. This defendant was fined £5 and costs for building contrary to the bye-laws, and £2 and costs for continuing to build after notice had been served upon him; and the magistrates greatly regretted that they had no power to order the whole of the houses to be pulled down. Several cases of a similar character were adjourned.

The Chesterton Union Authorities have awarded Mr. J. Allen Ramsay, of Great Shelford, a grant for successful Vaccination. This is the fifth time a grant has been obtained by this gentleman.

VACCINATION STATISTICS ANTI-VACCINATORS

By D. Manson Fraser, M.A.
Assistant Medical Officer, Metropolitan Fever H

To the unbiassed and intelligent mind of the Metropolitan small-pox hospit clusive evidence of the protective pow tion, and even the anti-vaccinators that, as they stand, they do seem t proof. But, say these gentlemen, the incorrect: 'We know they are incorr however sworn to, we should reject t rect'; the medical officers who draw th under 'a blinding prepossession in favc tion'; in short, the statistics are 'w view to prove the value of vaccination, fore valueless as unprejudiced evidenc sons who *will* not be convinced it is less to argue, and I shall not attempt the ordinary lay mind, however, wi knowledge of how such statistics are t of the objections of the anti-vaccinato to pass without explanation, might have weight. I desire, therefore, to give s tion, and to show that the objections u the statistics are wholly groundless.

It is objected, in the first instance, t those cases which are enumerated as u are really vaccinated, because many man is rash enough to say *all*) severe such a copious eruption as to render t invisible, and these 'are unhesitatingly as unvaccinated'. Were this true, it would show the vaccinated mortality much les unvaccinated mortality much greater t should be. Even if, however, such a classification were in use, the differenc apparent mortality produced by this err be infinitesimal, because the cases in w admission the marks are invisible by r the severity of the disease are very few—c in my experience, less than five per cent from this, the statement is utterly erroneo severe cases in which no marks can be dete not for this reason enumerated among the cinated. The actual method of classificati sued in the Metropolitan hospitals is as The patients are divided into three groups: 'Vaccinated', including all who present o arms any sort of mark which can be referred cination; 2. The 'Doubtful', including such no mark, and either know nothing regardi vaccination or assert that they have had the tion performed; and 3. Those who present n and who admit that they have never been ated. No classification could surely be m than this. It shows, moreover, not only that cinated cases appear among the unvaccinat that in all probability many of the 'doubtful belong to the unvaccinated group.

Regarding the estimation of the quality of ation marks, it is alleged that those are calle which appear on the arms of patients who are ing from a very mild type of small-pox. Th scarcely necessary to remark, is a groundle on the authors of the statistics. The divi vaccination marks into 'Good' and 'Imperf not determined by the severity of the disease given case, but have reference solely to an a standard, determined by examination of the

alone. This standard is defined at the foot of the annual tables of the Metropolitan Asylums District Board Small-pox Hospitals as follows: 'Class 1, or Good Vaccination.—A superficial area of not less than one-third of a square inch of one or more cicatrices thoroughly well marked in their foveation. Class 2, or Imperfect Vaccination.—A superficial area of less than one-third of a square inch of one or more well defined cicatrices, or a superficial area of the same or greater extent, but deficient in or wanting foveation.'

The two principal objections to the statistics of the Metropolitan small-pox hospitals raised by the anti-vaccinators,—the only objections that can be called even specious,—have thus a ready explanation, and no one, I believe, acquainted with this explanation can henceforth attach any weight to those objections. The statistics are based on unimpeachable methods, and are, I can confidently assert, drawn up with scrupulous accuracy, and by gentlemen who not only are not blinded by any prejudices in favour of vaccination, but are ready to hear and keen to observe whatever there may be against it.

URBAN AND RURAL MORTALITY IN GERMANY.

A PAPER read by Professor Finkelnburg at the recent Congress, in Cologne, of the Lower Rhenish Sanitary Association, deals with the above question, and is intended specially to prove that cities are not, of necessity, less healthy than country districts, and that where such is the case, the fact can be usually attributed to local influences affecting the hygienic or economical condition of the population. The society in question deals with a district rich in manufacturing industry, and, at the same time, possessing a sufficient proportion of rural population to give the comparative statistics of mortality a practical value. As an instance in support of the theory propounded, it is stated that in the Coblentz and Treves districts the mortality in the rural population is greater than among the denizens of towns.

Following the thread of the author's arguments, we find that the analysis of adult male and female mortality, and the comparison of such results with those affecting infantile mortality, bring before us a variety of interesting facts. The male population of cities is described as being less healthy than the female population, the diseases contributing to this result being mostly consumption, and affections of the heart, the brain, and the kidneys. Taking, however, for a standard the city of Cologne, statistics prove that the mortality amongst females over 30 years of age is not only less than that amongst male adults, but is less than the female death-rate for the same range of age in the rural parts of the Cologne districts. Bonn (situated at a short distance) also shows similar general results.

The annual mortality amongst men of 30 to 40 years of age is, in Cologne, on an average, 19 in 1,000, while that of the opposite sex is only 12. As to consumption, there are no statistics given as to the comparative deaths for the two sexes, but it is stated that from the age of twenty upwards the deaths of men from this cause show a marked predominance in the centres of the textile and metal industries—M. Gladbach, Crefeld, Solingen, Remscheid, etc. That this circumstance is connected with the industrial activity of these towns is forcibly suggested by the fact, that in the country districts, where labour of a similar character is carried on, the same result presents itself. The average annual mortality from this cause in the whole of Prussia is 32 to 33 in 10,000. In the Rhenish cities it is 50, while in the particular instance of M. Gladbach it is as high as 76. Epidemic diseases seem to show an excesssive urban mortality only in the case of young children, as compared with the results in the country.

The question of infantile mortality is dealt with rather fully, and, according to the figures quoted, is at its highest point where the population is most dense, and where the proportion of female labour in factories is the most considerable. The cities which unite these two unfavourable conditions in the highest degree are Cologne and Aix-la-Chapelle; the former containing 7,000 female operatives, and the latter, 8,000. The numbers of children who die before they are twelve months old are, respectively, 24 and 25 per cent. of those born, and this rate compares unfavourably with those of Coblentz and the smaller towns, where the proportion is from 11 to 21 per cent. There seems, however, to be a more favourable state of things in those districts where domestic labour (weaving, etc.) is general, although some of them are not so favourable to the life of adults. Thus, it is proved with a certain amount of clearness that infantile mortality is increased or diminished by the dwelling accommodation in towns, and by the amount of parental care which circumstances permit. This result is not a sure guide as to some diseases, as, while diarrhœa and similar ailments contribute a notable proportion to urban mortality in general, the deaths from diphtheria and whooping-cough in the Rhine provinces were more numerous in the country than in the various towns.

In conclusion, Professor Finkelnburg called attention to the fact, that the mortality in cities usually increases in the summer and autumn, while a similar augmentation of the death-rate is, as a rule, noticeable in the country during the winter and spring. He also adverted to the improved sanitary condition of Frankfort-on-Main and other German cities, urging upon the members of the Association to combine their efforts to make the authorities of the Rhenish cities equally alive to the necessity of sanitary reform.

The drainage works of Redditch and Headless Cross have recently been completed under the Local Board. The sewage from Redditch is conveyed by a system of brick and pipe sewers to precipitating tanks outside the lower portion of the district, where the solid matter is precipitated, and the effluent water passes over four acres of filtering ground. This ground is laid in terraces and drained, 25 ft. apart and 5 ft. deep; the filtered sewage-water passes off through these drains into the stream bounding the property. The tanks are placed at such a level that a large area of land in the valley below is commanded for broad irrigation purposes. The sewage of Headless Cross is taken by a separate system to tanks at the extreme end of this part of the district, and will be utilised by irrigation also. Flushing tanks are constructed at the ends of the sewers, fitted with Messrs. Bowes, Scott, and Read's automatic flushing syphon for passing periodical flushes of water through the sewers. The works have been carried out by Mr. G. Law, contractor, of Kidderminster, at a cost of £8,500, which is within the engineers' estimate, and the works have been completed within the nine months allowed under the contract. Messrs. Gotto and Beesley of Westminster are the engineers, and the works have been superintended by Mr. Baylis, the Town Surveyor.

THE
SANITARY RECORD.
MARCH 15, 1882.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

NOTIFICATION OF INFECTIOUS DISEASES.

WE need make no apology for recurring to the important subject of the Notification of Infectious Diseases. During the past month there have been several expressions of medical opinion with regard to it, and amongst these we would especially refer to the meeting of the Lancashire and Cheshire Branch of the British Medical Association, on Feb. 8th, to that of the South London District of the Metropolitan Counties Branch, on February 17th, and to the medical deputations to the Sanitary Committee of Bolton on February 22nd.* At these meetings the same objections to the measure were raised to which we called attention last month, and especially to the direct and indirect notification by medical men, under the compulsion of the infliction of a penalty in case of neglect. On the whole, however, it may be affirmed that the result of the discussions was favourable to some form of notification of disease, and at the meeting of the Lancashire and Cheshire Branch, the following resolution was carried by a large majority :—

'That, in the opinion of this meeting, the compulsory notification of infectious disease, is of great public and national importance. In carrying out this object, the meeting believes that the responsibility of notifying disease should rest with the householder; and that the medical attendant should possess the voluntary power of notifying cases of infectious disease.'

In the course of the remarks that were made by the different speakers, however, in addition to the objection already mentioned, reference was made to several other grievances in relation to the subject, and as some of these indicate real danger to the satisfactory carrying out of this most useful measure of sanitary progress, it becomes necessary to speak of them more in detail.

We would notice (1) the almost surreptitious manner in which the measure had been obtained in several towns; (2) the attitude of Medical Officers of Health towards the medical practitioner; and (3) the possibility of a tyrannical interference with liberty on the part of Sanitary Authorities.

1. With regard to the mode in which the several sanitary Acts had been obtained, it appears to us that a real grievance was pointed out. In many cases they had been included in private bills dealing with many subjects of the most heterogeneous description—'Omnibus bills', as they have been called; and as the provisions of these Bills are seldom or never challenged in the Houses of Parliament, their promoters not only, as Mr. Hopwood recently stated, 'steal a march on the Legislature', but they steal a march upon all those who are affected by the different clauses they contain; and thus, to modify slightly another remark of Mr. Hopwood's, a community 'is informed by advertisement that a meeting is to be held to take into consideration a bill for lighting streets with gas, etc.; in this way watchfulness is lulled to sleep, and no inquiry is made as to what is proposed, until, in the result, a *medical man* probably finds he is at the mercy of a policeman, and that he has somehow incurred a fine of *five pounds*.'

It is scarcely surprising that men's minds should be at once prejudiced against measures thus smuggled through Parliament, and it is most unfortunate that this useful means of preventing epidemics should be placed in this position. Surely the most straightforward course, and the one most likely to lead to a successful result, would have been to let the notification of infectious disease stand upon its merits, and to allow it to be fully and freely discussed in both Houses of Parliament. To follow, in fact, the course pursued by the Parliamentary Bills Committee of the British Medical Association.

2. With regard to the relations of Medical Officers of Health to the other members of the profession, we will only point out the absolute need of a careful tact and conciliatory demeanour on the part of the guardians of the public health. It was stated at the meetings in question that Officers of Health had publicly criticised the diagnosis of medical attendants; that they inquired what medicines the patients were taking; that persons suffering from scarlet fever and small-pox had been sent to hospital in defiance of the opinion of their medical advisers; and that they had interfered in other ways with the arrangements of households.

It is, of course, possible that some of these statements were exaggerated, or mistaken, but the complaints show how naturally jealous are medical men of interference between them and their patients. There is a danger lest Medical Officers of Health should try to magnify their office, and by associating themselves together in a distinct guild, that they should build up between themselves and the remainder of the profession a wall of separation that would be a serious barrier to the promotion of efficient sanitation.

3. The last item of reproach against the measure may probably be left safely to the management of the ratepayers of the towns said to be aggrieved by the passing of the Acts. Every Councillor knows very well that his re-election would be imperilled if he advocated any tyrannous exercise of power over the ratepayers. Whatever the provisions of the Acts

* Reports of these meetings are given in the *British Medical Journal* of March 4th.

in question, it is tolerably certain that they will not be enforced unless they are in harmony with public opinion. It becomes all the more necessary, therefore, that men's minds should be sedulously educated to see the great social and economical advantages that will flow from a careful and conciliatory administration of the measure for the notification of infectious diseases.

CHANNELS OF SMALL-POX.

THE Vestry of St. Pancras, it would seem, strongly object to a proposal of the Highgate Small-Pox Hospital Authorities 'to divert their drainage into the pipe-sewer recently constructed in Dartmouth Hill Park'. They do so on the ground that the district through which the pipe passes is thickly populated, and that the small-pox sewage passing through it might prove a danger to the inhabitants. We think that the Vestry have very little reason to fear the serious consequences they seem to anticipate.

If the proposed scheme were carried out, the large amount of water constantly passing from the Hospital into the drains would sweep rapidly down the hill into the main sewer—where it would become harmless—all the sewage of the hospital, and would give but little opportunity to the poison to spread, even if any such poison were contained in the sewage after it had passed from the Hospital drains. It is extremely improbable, however, that small-pox poison, even in the smallest quantity, should find its way into the common sewers. The poison of small-pox, even when in tolerably concentrated form, is destroyed by a free admixture with clean water and fresh air. That this is so there is abundant evidence to show. Thus, hospital wards, in which scores of small-pox patients have been treated, after being subjected to this method of disinfection, viz., by water and air, have been used for fever patients without evil results. Of this, several instances have come to our knowledge, and one remarkable case we may mention by way of example. During a small-pox epidemic the Fever Hospital at Homerton was used for small-pox, and after the small-pox epidemic had gone down, fever patients were again admitted. Before this took place the wards were thoroughly disinfected, and one ward was disinfected by this method simply. Among the fever patients treated in this ward, we are informed, no case of small-pox occurred.

It may therefore be confidently expected that, with a system of drains well ventilated and well supplied with water, any small-pox poison that may exist in the patients' excreta (which, if it does contain the poison, must contain it in very minute quantity, since the intestinal tract is practically untouched in this disease), or in the water in which the patients have been bathed, will be utterly destroyed before it can reach the common sewers. Moreover, while there exists no evidence to show that drains, even when badly constructed, can be the means of spreading small-pox, there is, at the same time, a considerable amount of evidence that good drainage does not spread it. Thus, at Homerton, the Fever and Small-Pox Hospitals of the Metropolitan Asylums Board lie in the same grounds and have a common system of drainage; yet there has never been a single case of small-pox arise in the fever block which could be traced to the drains. Other instances could be cited to the same effect. On the whole, we can assure the St. Pancras Vestry that, provided the drainage be good, no such danger as they apprehend will result from the passage into their sewers of the excreta of even a much larger number of small-pox patients than the Highgate hospital can accommodate.

NOTES OF THE MONTH.

WATER ANALYSIS.

Mr. C. Ekin, F.C.S., recently read a paper before the Pharmaceutical Congress, on the tests for nitrites in potable waters. He stated that the meta-phenelyndiamin test gives a distinct reaction with 1 part of nitrogen present in the form of nitrous acid in one million parts of water. The naphthylamin test detects with ease one part in one hundred millions, and with care even as little as one part in a thousand millions. The author shows, however, that the 'old-fashioned potassium iodide and starch test' is, to say the least, equally delicate. If the solution is allowed to stand for some days (in a stoppered bottle) even smaller proportions than one part in a thousand millions are indicated. The author complains, as omissions, that the Rivers' Pollution Commission made no separate determination of nitrates as distinct from nitrites, whilst the Society of Public Analysts, in their recent circular on Water Analysis, omit the subject entirely. This is the more to be regretted, as the nitrites, if present in a water, are evidence of recent sewage in the very act of decomposition.

INFECTION BY BOOKS.

Dr. Robert Elliott, the Medical Officer of Health for Carlisle, calls the attention of the librarians and library committees of that city to the possibility of scarlet fever being spread through the medium of books lent to persons sick and convalescent of the disease. He suggests that a list of all books sent out would enable cases of the fever to be traced, and thus be useful in more ways than one.

THE SEPARATE SYSTEM OF DRAINAGE.

The last Annual Report of the Massachusetts State Board of Health contains a short but excellent paper on what may be termed the 'small sewer' system of drainage. Considerable discussion has arisen from the construction at Memphis of a system of small drains, from which surface and roof water are entirely excluded. The Board, having duly considered the relative merits of the combined and separate systems of sewerage, have come to the conclusion that a separate system is only necessary when cellars are so low that they must be drained by pumping, whilst in other cases its only merit is its cheapness. The saving in first cost of sewers, when all the rain flows off over the ground, would be about three-

fifths, depending on the character of the soil, final economy depending entirely upon circumstances. The system would only be advisable where the branch sewers could incline not much less than one in a hundred. Moreover, surface drainage for rain is attended by a varying amount of inconvenience and damage, which increases with the growth of a town. In the dissimilar conditions affecting towns and cities is found sufficient reason for difference in methods of sewer construction. Where it is necessary to carry off storm water underground from closely built and densely populated districts, and where new sewers must be constructed for the purpose, the combined system is evidently the most economical. When storm waters can be provided for by an existing system of sewers, which has become unsuitable for the proper conveyance of sewage, or where there is no objection to the presence of this water on the surface of the ground, or immediately below it, a separate system may prove to be cheaper. Again, it may be advisable in some districts to combine the two systems; but although the general principles which govern this problem are comparatively simple, yet it would be unwise for any town to attempt its solution without the advice of an expert who had carefully considered all the conditions affecting the locality. Memphis remains the only city in the United States in which the separate system has been completely adopted; and it is yet too early to claim for it entire success.

POOR-RATES IN KENT.

An important decision by the Local Government Board is exciting great interest in the county of Kent. In March 1880, the district auditor for that county surcharged sixteen Guardians of the Medway Union for several disbursements made by them, on the ground that they had no legal authority to charge such expenses upon the funds of the Poor-Rate. The disbursements referred to consisted of fees paid to the Justices' Clerk, payments made for printed notices addressed to the ratepayers relative to the collection of the Poor-Rate, and for the posting of parochial notices, and a sum paid for making out the Poor-Rate. The Guardians appealed to the Local Government Board, who have closed a voluminous correspondence, extending over several months, by issuing an order announcing that they have decided that the smaller amounts were lawfully disallowed by the Auditor, but that the expenses were incurred under such circumstances as to make it fair and equitable that the same should be remitted. With regard to the surcharge of the larger item, £10, for making out the Poor-Rate, they found that the Auditor's decision was unlawful, and would therefore be reversed. The Local Government Board have also reversed the surcharge made upon the Dover Board of Guardians by the same Auditor.

THE ISOLATION OF INFECTIOUS DISEASES.

Dr. Thomas Wright of Cheltenham, in his annual report on his Urban District for 1881, notes in connection with the Delancey Hospital that the strong prejudice which formerly existed against allowing children and others suffering from infectious diseases to be removed from their homes and treated in this valuable institution has gradually diminished, and that consequently during the past year many cases of scarlatina have been sent from the houses of persons belonging to the middle and upper classes of society into the wards of the Delancey Hospital, with the best possible result to the patients themselves and the homes from which they were removed. This is in a great measure owing to the superior character of all the arrangements in the hospital itself, and to the growing conviction among reasonable people that nothing short of isolation of the patient can stop epidemics of contagious diseases, and that the removal of the infected individual from the midst of a population into special institutions maintained for their treatment is the only practical measure that can be relied upon. Patients are admitted into the private wards of the Delancey Hospital at a charge of, to subscribers, of one guinea, or donors of ten guineas, for themselves and members of their households, one half; and patients are received into the public wards at an uniform charge of two shillings a day.

GAS POISONS.

Professor Pobek of Breslau has made some experiments, from which it appears that, in poisoning by lighting-gas, the only poisonous agent is the carbonic oxide. In certain cases, when the gas traverses a stratum of earth not yet saturated, it leaves behind it the hydrocarbons with their characteristic odour; and in this case it may permeate the house without being detected by the smell. The analysis of this gas is given by Professor Pobek as 13.20 of heavy carburet of hydrogen; 12.52 marsh gas; 14.7 hydrogen; 0.76 carbonic oxide; 3.62 carbonic acid; 6.62 oxygen; and 60.62 nitrogen. To the danger of poisoning is added that of explosion, which is of comparatively rare occurrence, owing to the fact that only a certain well-defined proportion of gas and air will explode; and an explosion, which is serious with one volume of gas and four or five of air, becomes slight with one volume of gas and fourteen volumes of air. Gas vitiates the atmosphere by absorbing oxygen and disengaging a considerable quantity of heat. In burning gas imperfectly, as in heating appliances, an excess of moisture is produced, which is injurious to health.

POISONOUS SUBSTANCES FOR COLOURING FOOD.

The Prefect of Police, Paris, has expressly forbidden confectioners, distillers, grocers, and shopkeepers generally, to use for colouring sweetmeats, liqueurs, and alimentary substances, any of the following matters:—*Mineral Colours.*—The compounds of copper—blue verdegris, mountain blue. Compounds of lead—oxides of lead—massicot and minium. Oxychloride of lead—Cassel yellow, Turkey yellow, Paris yellow. Carbonate of lead—white lead, flake white. Antimoniate of lead—Naples yellow, sulphate of lead. Chromates of lead, chrome yellow, Cologne yellow. Chromate of baryta—yellow ultramarine. Compounds of arsenic—arsenite of copper, Scheele's green, Schweinfurth green. Sulphide of mercury—vermillion. *Organic Colours.*—Gamboge and Naples aconite. Fuchsine and its sub-products, such as Lyons blue. Eosine. Nitro derivatives, such as naphtol yellow and Victoria yellow. It is also expressly forbidden to make use of any of the above-named substances for colouring the paper used for wrapping up any article of food. Both manufacturers and dealers are held personally responsible for accidents which may occur from the use of alimentary substances, or from wrapping paper, coloured with any of the above-mentioned matters. Manufactories and shops are to be inspected annually,

or more frequently, if deemed necessary, so as to ensure the observance of these regulations. Infractions will be dealt with according to law, before the competent tribunals. The chief of the municipal police, the mayors, the commissaries of police, the inspector-general of wholesale and retail markets, the head of the chemical laboratory, and others whom it may concern, are charged with carrying the measure into effect.

PARKS FOR THE PEOPLE.

Mr. David Davies, the Medical Officer of Health for Bristol, in his report on the sanitary condition of the city and county for the quarter ending December 1881, calls the attention of his Sanitary Authority to the great need there is of more breathing spaces or public parks in some of the crowded districts under his care. He refers especially to the sub-districts known as St. Philip and Bedminster, and but too truly remarks:—'Without the amenities of life in their ill-ventilated homes, life must be very dismal, especially for the young, where they can breathe the open air only in the narrow smoky streets, and cannot meet for the usual recreations of youth except on the top of the ash-heaps, or in the restricted school grounds which are not generally very attractive to children. Mr. Davies has no hesitation in saying that a public park in each of these two districts would materially lessen the mortality, as they would give the inhabitants an easy and attractive means of breathing, at times, air less contaminated than usual, and of exposing themselves and their personal surroundings to the open air, *the best of all disinfectants*.' Mr. Davies also has a very strong opinion as to the moral effect produced by public parks and recreation grounds as places of resort for the people, but does not enlarge on this branch of the question, as he considers it it somewhat beyond his range as a health officer.

MODERN BLOCK DWELLINGS.

Of late years, in order to accommodate as many of the working-classes on a given site as possible, dwellings have been erected in flats, such as those built by the Peabody Trustees. In these blocks the inhabitants are almost always said to enjoy a far better state of health than in ordinary houses, and the death-rate to be very low. The death-rate, if calculated in those only who die in the dwellings, would almost necessarily be below the average, as the deaths of those who fall ill and are removed to hospitals are never added on. In some flats of not quite so good a kind, but comparatively recently built, at the back of Kensington Square, as many as twenty-one cases of illness came under Dr. Dudfield's notice in less than a month. Three of these were cases of enteric fever, one of diphtheria, and the others of whooping-cough and inflammatory diseases of the lungs. On examination it was found that there was a common sink-waste for each flat, and that puffs of sewer gas escaped from time to time into the dwellings. The yards were imperfectly drained, and only bell-traps were provided, which got choked and useless in wet weather. Under these circumstances notices have been served on the owners to properly pave and drain the yards, to disconnect the sink-wastes from the drains, and improve the ventilation. We would, however, ask what was the surveyor about to allow houses to be built recently with such defects, and how is it that the defects were not discovered until disease and death had pointed out the bad sanitary condition of these dwellings? The overseeing of the officers in the surveyor's department is not sufficiently frequent and minute in most Metropolitan parishes to prevent the entrance of sewer gas into houses which are being built even at the present time, and there are not, usually, a sufficient number of inspectors of nuisances engaged to examine such premises so frequently as is necessary. Much illness and many deaths in London arise from similar causes, and should be prevented by regular inspection and removal of all the nuisances discovered.

THE PUBLIC HEALTH

DURING FEBRUARY 1882.

THE mean temperature of the air at the Royal Observatory, Greenwich, during February was 41°.8, and exceeded the average February temperature during 100 years by 3°.3. The mean was for the most part considerably below the average during the first ten days, whereas it shewed an excess during the remainder of the month. The coldest day was the fourth, when the mean was 30°.6 and 10°.1 below the average; the warmest day was the fourteenth, when the mean was 50°.7, and shewed an excess of 12°.0. The rain was measured at Greenwich on but eight of the twenty-eight days of the month, the aggregate fall being 1.1 inches, which was 0.4 of an inch below the average February rainfall during sixty one years. The sun was above the horizon during 277.9 hours in February, but only thirty-six hours of bright sunshine were recorded at Greenwich; the average amount of bright sunshine recorded during the corresponding month of the five years, 1877-81, was 35.1 hours. The direction of the wind during the month was very variable.

In twenty-eight of the largest English towns, now dealt with in the Registrar-General's weekly return, having an estimated population of nearly eight millions and a half of persons, 23,989 births and 17,267 deaths were registered during the four weeks ending 25th ult. The births were equal to an annual rate of 37.0 per 1,000 of the aggregate population of these twenty-eight towns. The birth-rate in these towns was considerably below the rate recorded during February 1881 in the twenty towns then dealt with in the weekly returns. The lowest birth-rates in the twenty-eight towns last month were 27.2 in Plymouth and 29.0 in Halifax; the rates in the other towns ranged upwards to 40.6 in Bolton, 42.1 in Sunderland, and 46.3 in Cardiff. The birth-rate was equal to 37.6 in London, whereas it did not average more than 36.5 in the twenty-seven provincial towns.

The annual death-rate in the twenty-eight towns during the four weeks of February averaged 26.6 per 1,000, shewing an increase of 2.6 upon the rate prevailing in the preceding month. The average rate in the twenty towns in the corresponding month of the three years 1879-81 was equal to 26.4, 29.1, and 23.9 per 1,000 respectively. The lowest rate of mortality in these towns during last month was 17.5 in Halifax. The rates in the other towns, ranged in order from the lowest, were as follow:—Leicester, 18.3; Cardiff, 18.7; Birkenhead, 20.3; Bristol, 21.2; Derby, 21.2; Birmingham, 22.2; Nottingham, 22.9; Leeds, 23.0; Sheffield, 23.0; Hull, 23.1; Huddersfield, 23.3; Sunderland, 23.3; Bradford, 23.4; Portsmouth, 24.1; Newcastle-upon-Tyne, 24.5; Norwich, 24.8; Oldham, 25.1; Wolverhampton, 25.5; Salford, 25.6; Liverpool, 26.3; Manchester, 27.3; Plymouth, 27.3; Preston, 28.0; Bolton, 29.1; London, 29.4; Blackburn, 31.0; and the highest rate during the month was 32.0 in Brighton. The death-rate was equal to 29.4 in London, while it did not exceed 24.2 in the twenty-seven provincial towns, which have an aggregate population somewhat exceeding that of London.

The 17,267 deaths from all causes in the twenty-eight towns during the four weeks of February included 1,154

from whooping-cough, 496 from measles, 377 from scarlet fever, 208 from 'fever' (principally enteric), 128 from diarrhœa, 101 from diphtheria, and 73 from small-pox. Thus 2,537, or nearly 15 per cent. of the deaths from all causes, were referred to the principal zymotic diseases. These were equal to an annual rate of 3.9 per 1,000 in the twenty-eight towns, and, principally owing to the increased fatality of whooping-cough, shewed a decline from the rate that prevailed in the preceding month. The zymotic death-rate last month was equal to 3.9 per 1,000 in London, and averaged 3.4 in the twenty-seven provincial towns. It ranged in these towns from 0.8 and 1.2 in Derby and Halifax, to 8.8 in Blackburn, and 11.1 in Brighton.

Whooping-cough was, as it had been in December and January, by far the most fatal zymotic disease in these large English towns. The annual death-rate from this disease, which had steadily increased from 0.38 to 1.21 per 1,000 in the four preceding months, further rose to 1.78 in February; in the corresponding month of 1881 the death-rate from whooping-cough in the twenty large towns, did not exceed 0.55. The fatality of whooping-cough in London again considerably exceeded that which prevailed in the provincial towns; the highest death-rates from this disease were 2.0 in Salford, 2.8 in London, and 4.4 in Brighton. The death-rate from measles in the twenty-eight towns averaged 0.77, and corresponded with the rate that prevailed in January; it considerably exceeded, however, that which prevailed in February 1881, when it did not exceed 0.27. The highest death-rates from measles last month were 3 8 in Brighton, 4.7 in Norwich, and 6.5 in Blackburn. The rate of mortality from scarlet fever was equal to 0.58, and showed a further decline from that which prevailed in the preceding months; the average rate in the provincial towns was more than twice as high as that which prevailed in London. The highest death-rates from scarlet fever during the last week in the provincial towns were 1.9 in Sunderland, 2.3 in Brighton, and 3.2 in Hull. Scarlet fever caused thirty-nine more deaths in Hull during the four weeks of February, raising the fatal cases of this disease recorded within the borough since the 1st of July last to 740; in October and November last, the death-rate from this cause was equal to 11.2 per 1,000, since which it has steadily declined, as above stated, to 3.2 in February. Fever (principally enteric) caused 208 deaths in the twenty-eight towns during February, of which 90 occurred in London, and 118 in the twenty-seven provincial towns. The annual death-rate from fever averaged 0.32 in the twenty-eight towns; the largest proportional excess in the fever-rate last month occurred in Liverpool, Preston, and Blackburn. The fatality from diphtheria again exceeded the average, although showing a decline from that recorded in preceding months; the death-rate from this disease was equal to 0.16 per 1,000, against 0.12 in the corresponding month of last year. The 101 deaths from diphtheria in the twenty-eight towns included 53 in London, 17 in Portsmouth, 6 in Birmingham, 5 in Liverpool, 4 in Manchester, and 2 each in Brighton, Salford, Preston, Newcastle-upon-Tyne, and Cardiff. The epidemic of diphtheria in Portsmouth, which has prevailed since the latter part of 1880, shows but little sign of decline; the death-rate from this disease within the borough, which averaged 1.7 per 1,000 during 1881, was equal to 2.6 during the first two months of this year. During February, 73 deaths from small-pox were registered in the twenty-eight large towns, showing a decline of 27 from the number in the previous month. Of those 73 fatal cases, 55 occurred in London, 4 in Bolton, 3 in Nottingham, 3 in Leeds, 2 in Liverpool, 2 in Brighton, 2 in Hull, and 1 each in Salford and Bradford. Judged by the returns of the Metropolitan Asylum Hospitals, as well as by the number of deaths from this disease, the prevalence of small-pox in London shewed a decline during February. The number of small-pox patients under treatment in these hospitals, which had been 457, 485, and 490 on the last Saturdays in the three preceding months, declined to 436 at the end of February. The Convalescent Hospital at Darenth was closed at the end of the month. The average *weekly number* of new cases admitted to those hospitals, which had been 78 and 84 in December and January, declined again to 79 in February, and fell to 45 in the first week of March. The largest proportional fatality of small-pox in the metropolis during last month was again recorded in the south group of registration districts.

The rate of infant mortality, measured by the proportion of deaths under one year to births registered, averaged 165 per 1,000 in the twenty-eight towns during February, showing an increase of 14 upon the proportion prevailing in January. This proportion of infant mortality was equal to 170 in London, while it averaged 161 in the twenty-seven provincial towns, and ranged from 97 and 111 in Cardiff and Portsmouth, to 209 in Salford, 238 in Blackburn, and 251 in Oldham.

The fatality of diseases of the respiratory organs, judged by the Metropolitan returns, showed a marked further increase during February. The average weekly number of deaths referred to these diseases in London, which had increased from 159 to 482 in the five preceding months, further rose to 739 in February. This number exceeded by 189 the average weekly number in the corresponding months of the last ten years. The annual death-rate from these diseases in the metropolis, which had steadily increased in the five preceding months from 2.2 to 6.5 per 1,000, further rose to 9.9 in February. The annual death-rate from these diseases during last month did not exceed 6.5 in Liverpool and 6.9 in Salford. The marked excess of mortality from these diseases in the metropolis was undoubtedly due to the dense fogs.

During the four weeks of February, the causes of 405 deaths in the twenty-eight towns were not certified either by a registered medical practitioner or by a coroner. These uncertified deaths were equal to 2.3 per cent. of the total deaths registered, showing a slight decline from the proportion prevailing in January. The percentage of uncertified deaths did not exceed 1.2 per cent. in London, whereas it averaged 3.6 in the twenty-seven provincial towns. All the causes of death were duly certified in Birkenhead and Cardiff, and the proportion of uncertified deaths was but 0.4 and 0.6 in Brighton and Plymouth, whereas it ranged upwards in the other towns to 7.0 in Halifax, 7.7 in Oldham, and 9.7 in Salford.

Among the population of little less than a million persons estimated to be living in the outer ring of suburban districts round London, the annual death-rate from all causes during February was equal to 21.5 per 1,000, and exceeded by 2.7 the rate that prevailed in the previous month. The annual death-rate from the principal zymotic diseases was equal to 2.6 per 1,000, against 2.0 in January. During the four weeks of February, 21 fatal cases of small-pox were recorded in the outer ring, of which 8 occurred in West Ham and 9 in Croydon sub-districts. Whooping-cough shewed a further increase in fatality, and caused 84 deaths in the four weeks; 29 deaths from measles, 25 from scarlet-fever, and 19 from diphtheria, were also recorded.

Colonel Frank Bolton, the Metropolitan Water Examiner, states in his monthly report that all the Companies are at present voluntarily moving in the matter of giving a constant supply, under the provisions of the Metropolis Water Act, 1871, in some portion of their districts.

A CREMATION CASE.—Mr. Justice Kay has delivered judgment in the case of Williams *v.* Williams, in which Miss Eliza Williams claimed from the executors of the late Mr. Henry Crookenden the sum of £321 as the expenses of burning his dead body, in accordance with a letter which in his lifetime Mr. Crookenden had addressed to her. The expenses of the cremation he directed to be paid out of his estate. The funeral of Mr. Crookenden took place in an ordinary manner, but afterwards the body was exhumed and subjected to cremation by Miss Williams. His lordship said that by the law there was no property in the dead body of a human being. Miss Williams committed a trespass in exhuming the body of Mr. Crookenden, and the claim for cremation expenses must be disallowed.

SPECIAL REPORTS.

THE POLLUTION OF DRINKING-WATER.

As sanitary science and a knowledge of its application to the health of communities advances, the primary importance of the purity of drinking-water is every day more distinctly recognised. Neglect and pollution of the sources of drinking-water have been shown, by John Simon, Snow, Lyon Playfair, and Virchow alike, to lie at the basis of a great part of the mortality from typhoid fever, diarrhœa, dysentery, and other of the zymotic diseases which affect civilised communities in town and country.

American scientists and physicians are awaking to the special dangers of the pollution of the drinking-water, not only of their great cities, such as New York, Boston, Philadelphia, and indeed most of the great cities of that continent, but constant reports of the National Boards of Health indicate the occurrence of severe outbreaks of gastric fever and continued elevation of death-rate, owing to the want of purity in the drinking-water, and of pollution of the ordinary sources of water-supply. These pollutions consist in the fouling of streams, ponds, and reservoirs, as in Philadelphia, Boston, and New York, with the outflow and refuse of factories; or, in villages and country houses, the pollution in a similar way of wells and rivulets by contiguity with cesspools and filtration from the soil.

A special source of pollution of drinking-water in America is now ascertained to be the addition of ice, floating in lumps in the water which is drunk at table. This peculiarly American institution is little known in Europe. Its dangers are twofold. The habit of swallowing lumps of ice and of the water containing it is most injurious to the digestion, bringing down the temperature of the stomach so low as temporarily to arrest the digestive process; and to this habit of drinking quantities of ice-water is no doubt in a great degree attributable the prevalence of indigestion and dyspepsia which undermine the health, destroy the strength, and prematurely age so many American men and women. A further special source of danger has been noted, for the ice so used is apt to be taken, not with scrupulous care from an absolutely pure source, but is very liable to be, and is frequently found to be, taken from sources which are themselves contaminated by the pollution from the outflow of sewers, etc.

There is a popular but entirely mistaken notion that ice is in its nature pure and innocuous; it is, on the contrary, very apt to be impure and noxious, and may easily contain the germs of fatal disease. The Americans are, however, taking this matter in hand, and may, no doubt, be expected to devote the energy of future years to the purification of their sources of water-supply, a matter, however, of much difficulty and great cost when once the necessary precautions have been omitted at the outset in the growth of towns and villages. Meantime, they have, to some extent, the remedy in their own hands, and are largely aware of it, as is proved by the large consumption of Apollinaris water, which, by its absolute purity, affords complete guarantee against the dangers of zymotic disease incidental to ordinary drinking-water. Its sparkling and refreshing character renders quite unnecessary the introduction of ice into it. There is, of course, no objection to icing Apollinaris, as champagne is iced, by the external application of cold until its temperature is brought down in hot weather to a pleasant coolness. So treated, it is a beverage as refreshing and agreeable as it is pure and wholesome.

Earl Spencer, K.G., the President of the International Medical Exhibition, at the great Medical Congress in London recently, referred to Apollinaris in his opening address as a typical beverage approved by the faculty here. This approval is ratified by the unerring tastes of the cultivated populations of the world. The desiderata of original purity laid down by the Right Hon. Lyon Playfair as the indispensable conditions for water, which can never be freed from sewage pollutions when once they have been allowed to pass into it, are amply fulfilled by Apollinaris. It may be true, as a great London daily paper has said, that not every citizen can afford himself the luxury and safeguard of drinking a pure, natural mineral water such as Apollinaris. It remains a fact that this water, aptly described by Professor Bartlett as 'a type of purity', has attained the position of being 'the favoured beverage of the favoured classes', and will probably long remain a shield of safety to those who value their health, and are determined that their drinking-water shall, like Cæsar's wife, be above suspicion, and free from the perils to health attending the use of ordinary drinking-water, and the daily insidious risks of the ice water of the period. The mortality of New York is 31 per 1000, while that of London is only 20 per 1000. Purification of drinking-water would at once bring down the mortality largely; meantime, the use of Apollinaris is a valuable safeguard.

PARISH GUILDS OF HEALTH.

A PROPOSAL to establish Parish Guilds of Health, to prevent fevers and disease in houses, by aiding, supplementing, and preserving the work done by Local Surveyors, Medical Officers of Health, and others, was brought before the National Health Society, by Sir Henry Cole, K.C.B., at a recent meeting held at 44, Berners Street (Mr. Ernest Hart in the chair), with the view of obtaining the National Health Society's co-operation in the work.

SIR HENRY COLE explained that it was proposed the Guild for Health should be voluntary, self-supporting and self-managing, and that it should be established in *every parish district at least*, in connection with a School, Mission House, or other suitable place. The objects were stated to include the distribution of rules on all subjects connected with house-drainage, water-supply, and general house sanitation, issued by Local Boards of Health and kindred societies; to supply sanitary publications at the cheapest rate; and to issue a cheap periodical on sanitary matters, with the special view of informing householders in this respect; to promote the proper removal of infectious cases from private dwellings; to provide skilled labour for the performance of sanitary work required by the householder; and for the examination of drains, cisterns, pipes, kitchen boilers, etc.; to exhibit and sell specimens of various sanitary apparatus, disinfectants, etc.; the proper management of the dust, garbage, and other minor matters connected with house sanitation. The proposed scheme included the appointment of a person, whose work it would be to distribute sanitary information; aud the election of officers in each district, with power to appoint contractors to carry out sanitary work, at charges fixed by the Committee. A small nominal fee

would be paid by each member of the Guild, and subscriptions would be invited to promote sanitary arrangements for the poorest class. General Cotton, when lately discussing this subject with him, had made the graphic statement that the action of a dwelling was not automatic. Constant care and attention were necessary to keep in proper working order all the various sanitary apparatus for drainage, water and air supply, cleanliness, etc. The householder had to look to the state of the earth, air, fire, and water connected with the house. Unless some means were used to spur on the individual to look to his own interest in his house, the action of Parliament and of municipal authorities would be ineffectual in bringing about the desired results. If attention were not given to the condition of the household boiler for a year or two, the householder must not be surprised if the boiler, acting badly, ultimately bursts, as it is an inevitable result. The present system of removing dust and filth from buildings he characterised as barbarous and dangerous to the health of all, but he did not despair of eventually getting parish authorities to adopt a more efficient system, as it would save a great deal of trouble. The same held good of the water system; if proper attention were not given to see the arrangements for water supply through the house, and they were not in perfect order, and proper precautions were not taken to secure protection against frost and dirt, the householder must continually experience trouble. In his opinion a station of health was a necessity—a place where all the information relating to the health of the house could be freely obtained. In his own parish of St. Mary Abbots, Kensington, any householder might obtain a written report from the surveyor of the sanitary state of his house, and the necessary requirements in it, by making a payment of five shillings for a house under £100 a year. This provision, he believed, did not exist in other parishes. The individual must be made to feel that it was his interest and his duty to keep his house properly in order and himself healthy. If he were spoken to about the bye-laws of the parish he knew very little about them. There was no one who had wished to look into the parish laws but had found it very difficult to get at them, and when he had done so, found it very difficult to understand them and put them in action. Sir H. Cole himself had been compelled to do the best he could, and to go from one place to the other to seek information and assistance. The pith of this was that the individual must look after himself, if he wished to be as healthy and comfortable as he might be. Sir Henry Cole thought the collection of the various laws respecting the taking of a house and keeping it in order was a work which might very properly be undertaken by the National Health Society, and he should be delighted to hear that the scheme was one which that society would find it its pleasure and interest to promote.

The CHAIRMAN said it would be quite within the ordinary proceeding of their Society to collect and collate bye-laws and rules in the different London parishes, relating to buildings; to print a statement of the duties of Medical Officers and Inspectors, to the extent to which householders were enabled to have recourse to those officials for keeping their houses in order; and it was quite within their scope to publish any and all information as to drainage, ventilation, water-supply, and heating of houses; and to prepare a suitable and popular handbook on the subject, which might be issued at a very cheap rate. But they should see clearly what was to be the scope of such a work, as there were already a number of popular treatises, under separate heads, such as the little publications of Dr. Parkes on personal Hygiene; various authorities on Healthy Houses; a useful little work by Prof. du Chaumont, and another by Dr. Corfield; and a good deal of available literature. But what there was not available was a little book which he had long thought it might be advisable for the Society to publish, a little work, which might, perhaps, be called 'The Citizen, his Sanitary Duties, Relations, and Powers'; what their duties were in respect to their houses, their neighbours, and their relations; what it was incumbent on them according to law, and what steps they could take. But when they came to Clause *b* in Sir H. Cole's proposal, to exhibit and sell specimens of various sanitary apparatus, etc.; and to Clause *d*, which was that they should provide skilled labour for carrying out sanitary work, they came to a different part of the question and a different principle. This was a commercial proposition, which meant the opening of a shop, and a shop of a very extensive kind. One of the suggestions was that people were to know what were the best things for cleaning their drains, and the best kind of disinfectants, etc. But to endorse anything of the kind with the Guild's name would be at once to give it an artificial value.

Sir HENRY COLE stated that he had not proposed establishing shops, but rather to induce existing shops to sell and exhibit suitable sanitary apparatus, such as cleaning-machines for house drains, different washing machines, disinfectants, etc.

Mrs. LAWRENCE suggested the formation of local committees in connection with the scheme.

The CHAIRMAN said he was glad to hear that they purposed keeping clear of establishing shops for themselves; and he thought there was nothing in the scheme in which they could not effectually assist. The work would consist in the establishing of local committees, of a somewhat similar kind to that which they had as a sanitary committee, and, as far as possible, to give a practical character to the establishment in each parish of a station or room, which might be opened by private enterprise, in which specimens could be seen.

Sir HENRY COLE said it would be necessary to get at least three persons in each district to interest themselves in the question.

The Rev. Mr. LÖWY suggested the appointment of a special sub-committee to consider the proposed scheme, with the view of giving it practical shape.

The CHAIRMAN was of opinion, that a large public meeting would be more effectual for this purpose.

After further discussion, the following resolution was moved by Major-General COTTON, seconded by Mr. ERNEST TURNER, and passed unanimously:—'That the National Health Society having heard the statement of Sir Henry Cole, in respect to the proposed Parish Guilds, approves the objects stated, and will assist within its sphere in carrying them out.'

The bill of the London and South Western Spring Water Company, which proposes to obtain water from the chalk at Epsom and Carshalton for the supply of a large portion of the south-western suburbs of London, including Wimbledon, Putney, Barnes, Sheen, Mortlake, and Kew, has passed the Standing Orders Committee of the House of Commons. The only opponents were the water companies at present supplying the above districts, and petitions in favour of the bill were presented by most of the parishes proposed to be supplied.

THE SOCIETY OF MEDICAL ICERS OF HEALTH.

Society was held on Friday, February ɔe, President, in the chair.

tlemen were elected extra-Metropolitan ɛty:—Mr. C. Ticehurst, Medical Officer rsfield Rural District, and Mr. A. E. ficer of Health for Sunderland. The were elected Associates of the Society: r. Carl Renner, Dr. G. D'Arcy Adams, Dr. B. A. Whitelegge.

al, Medical Officer of Health North- anitary District, was nominated as an ıember of the Society.

alled attention to the Infectious Diseases ıd it was resolved that this should be cil for consideration and report, with pal Government Bill, as soon as the

EDICAL OFFICERS OF HEALTH.

ıen took place upon the right of a Local any alteration in the Report of the ealth, and the opinion was unanimously ıthority had no such power.

PENTER read a paper entitled 'Some Increase or Modify the Infectivity of ill be found at page 362. In the dis- ed,

, that his opinion was in accord with er, that the recurrence of scarlatina in had previously occurred, was often due from the sewer into the house, and that ibility the explanation of the re-appear- fter thorough disinfection had been care- He had to thank Dr. Carpenter for first to this fact, and pointed out that Dr. h, had also shown the relation which irulence of scarlatina and the sanitary ı which it occurs. The recognition of lead to the Health Officer's visits to nore welcome.

ed out that where no sewers existed, it h to have scarlatina in a severe form. fluences than the sanitary condition of he type of disease, for instance, where not had scarlatina themselves, the more susceptible to its influence. He ɔm of depending upon a fortnight's

ve a brief account of an outbreak of rict, and in St. Pancras. On January application for the disinfection of her tention to the prevalence of this disease ɔod, which was attributed to a milk- e instituted an inquiry, and found that the cases were in the walk of a par- A milk carrier in the employ of the ill with scarlatina, while another child quamating. These cases were removed outbreak subsided. An examination hich the milk came failed to give any na having existed there.

felt the importance of Dr. Carpenter's t played by a deteriorated condition of people susceptible to scarlatina. Re- of the admission of steam into sewers, e advantage that would result from a drains.

URPHY stated that his experience of hospital, showed that severe and mild ıe from the same house, the difference ng on some hereditary predisposition. or instance, suffered more severely than ɔrthy of observation in connection with St. Giles and St. Pancras, was the mild- g persons of all ages attacked, suggesting the idea, that with increased knowledge there might in the future be a safe method of introducing the disease into the system, for the purpose of protecting it against more severe attacks. He also referred to cases where the period of infectiousness was proved to have lasted seven weeks.

Dr. CHILD said, that he had once had considerable experience of an outbreak of scarlatina in houses in connection with a sewer in which a large deposit was found. He would not be satisfied with a shorter period of isolation than seven weeks.

Dr. TRIPE stated that there were reasons for believing, that if sewer emanations do not give rise to scarlatina, they will predispose to it and to diphtheria. He had just had a local outbreak of it in a Board School, and had found that the rain-water pipes opened directly into the drain, while their upper ends were immediately under the windows of the school, thus giving ready access of the air from the drain into the house. Scarlatina is certainly spread by means of the sewers as well as by milk. He called attention to the necessity for the more thorough examination of house-drains, and to the use of oil of amber for this purpose.

After a few words in reply from Dr. Carpenter, the Society adjourned.

LONDON SANITARY PROTECTION ASSOCIATION.

THIS Association was started on the 1st January 1881, and public attention was first called to it by a lecture delivered before the Society of Arts by Professor Fleeming Jenkin, on January 12th. The whole number of members at the end of the year had increased to 192, with three subscribers. By far the greater number of these members have joined on account of private houses, but a few public buildings have been put in charge of the Association as regards their sanitary arrangements, such as the Commercial Union Assurance Company's Offices, in Cornhill; the Central London Ophthalmic Hospital, Gray's Inn Road; the Sick Children's Hospital, Bell Street, Edgware Road; and the Choir House, Westminster Abbey, as well as several large schools. It is a noteworthy fact, that of the 192 members, 22, or about 11 per cent., are medical men, most of whom have joined on account of their own private residences, thus showing that the members of the medical profession are alive to the advantage to themselves and their families, of having the sanitary state of their houses attended to.

The need for this attention is most clearly shown by the Engineer's Reports, which show that of the total number of houses inspected, in 6 per cent. the drains were entirely stopped up, and all the sewage soaked into the ground under the basement of the house, there being no connection whatever with the sewer: that in about one-third the soil-pipes were leaky, allowing sewer-gas to escape through the leaks into the house; that in about one-third the overflow-pipes from the cisterns discharged into a soil-pipe or drain. No water, as a general rule, goes down these overflow-pipes from one year's end to another, but sewer-gas comes up them from the drains, and contaminates the water in the cisterns. The reports also show that more than half the houses inspected had waste-pipes from baths or sinks connected directly with soil-pipes or drains, generally, it is true, through syphon traps; but, if any of the appliances should be disused for a time, and the water in the trap dry up, these waste-pipes would provide a direct channel for sewer-gas into the house. These are not vague statements, depending upon the memory of the Engineer, but are the result of an elaborate analysis of the Reports prepared by order of the Council.

At the first annual general meeting of the Association, held in the rooms of the Society of Arts, Prof. Huxley, having read the report, pointed out that the Society, though it had only been in existence for a short time, had worked successfully. The houses examined had not been the dwellings of poor people, and therefore liable to be found in an insanitary condition, but had been houses occupied by

well-to-do people, and of these, 6 per cent. were in an absolutely pestiferous condition, leaving it to be the merest chance that they had not become hot-beds of disease. In addition to this, in two-thirds of the houses inspected there were defects in the drainage arrangements, such as must fill any careful person with alarm, especially where children or delicate persons were among the occupants. Prof. Fleeming Jenkin, one of the consulting engineers of the Association, spoke of the careful manner in which the business arrangements of the Association were conducted, and expressed an opinion that the continued existence of such associations as this must necessarily result in a much more efficient official inspection of dwelling-houses in all parts of the country. Speaking from personal experience of Edinburgh, in which only a similar association exists, Prof. Jenkin said, during the recent run of an epidemic of typhoid, there had only been one case in any of the houses under the charge of the Association, and in that case the fever was shown to have been contracted by the lady of the house while visiting the sick poor in the vilest districts of the city.

Mr. Timothy Holmes, (the hon. treasurer), in presenting the balance sheet, which showed a balance in hand of £74 at the end of 1881, said, that in the first two months of 1882, forty-two new members had joined, and only two of the old members had left the Association, so, at the moment of speaking, the Association numbered 232 members, and had a balance of £100 in the bank.

THE PEABODY DONATION FUND.

THE annual report of the trustees of this fund shows that the net gain of the year, from rents and interest, has been £29,751 1s. 9d., as shown by the annexed accounts. The sum given and bequeathed by Mr. Peabody was, in 1862, £150,000; in 1866, £100,000; in 1868, £100,000; and in 1873, £150,000; making a total of £500,000; to which has been added money received as rent and interest, £280,448 4s. 9d., making the total fund on the 31st December last £780,448 4s. 9d. The trustees have borrowed and are owing the Public Works Loan Commissioners £62,833 6s. 8d. The expenditure to the end of the year has been £781,040 9s. 7d. Up to the end of the year, the trustees had provided for the artisan and labouring poor of London 6,160 rooms, exclusive of bath-rooms, laundries, and washhouses. These rooms comprise 2,787 separate dwellings, which were occupied by 11,459 persons. 432 new dwellings have been opened by the trustees during the past year, and for these there have been upwards of three thousand applicants. The average weekly earnings of the head of each family in residence at the close of the year was £1 3s. 7¾d. The average rent of each dwelling was 4s. 5¼d. per week, and of each room 2s. The rents in all cases include the free use of water, laundries, sculleries, and bath-rooms. In order to remove a misapprehension which they suppose is entertained in many quarters that the benefits of the fund are enjoyed by a class for which they were not originally designed, the trustees append extracts from Mr. Peabody's letters and trust deeds to show that he fully understood and personally sanctioned the two leading principles on which his fund has since its origin been administered: First, that the buildings shall be occupied by tenants of the working classes, paying a reasonable rent; secondly, that the income thus obtained shall be applied to the construction from time to time of fresh buildings similar to those already existing, so that the operation of the fund may admit of indefinite though gradual extension.

IMPROVED INDUSTRIAL DWELLINGS COMPANY (LIMITED).

THE half-yearly meeting of the Improved Industrial Dwellings Company (Limited) has been held. Alderman Sir Sydney Waterlow, M.P., the chairman, presiding. The report presented stated that the whole of the capital was subscribed—viz., £375,000 in fully-paid stock and £125,000 in shares of £10 each, on which £4 per share had been called. The capital paid up was £425,000. The loans received from the Public Works Loan Commissioners amounted to £291,000. An additional loan of £15,000 had been granted and would shortly be taken up; and further sums, amounting to £21,000, had been applied for in respect of the buildings now being erected. The total expenditure on capital account was now £744,007. The expenditure on works in progress had averaged £58,500, of which £42,700 was only partly productive and £15,800 wholly unproductive. The income for the half-year was £36,168 and the expenditure £21,470, leaving a divisible profit of £14,698, which, added to the balance, £249, brought forward from last year, gave a total of £14,948 available for dividend. The directors recommended the payment of the usual dividend at the rate of 5 per cent. per annum, free of income-tax, which would absorb £10,625; that £4,000 be added to the reserve fund for the equalisation of dividends, which would then amount to £47,000; and that £323 be carried to the next account. The Chairman moved the adoption of the report, which was carried unanimously, and the usual dividend at the rate of 5 per cent. was declared. Mr. Alderman Finnis, Mr. Alderman Stone, and Mr. Scrymgeour, the retiring directors, and Mr. E. Hart, the auditor, were reappointed.

RULES OF THE BIRMINGHAM SANITARY OFFICERS' ASSOCIATION.

WE have received the following rules from the Secretary of the Birmingham Sanitary Officers' Association, which we print, believing that they may be interesting to many of our subscribers:—

1. *Name and Constitution.*—This Association shall be called 'The Sanitary Officers' Association', and shall consist of Inspectors of Nuisances and other officers engaged in the Health or Sanitary Department of any Urban or Rural Sanitary Authority, and of honorary members who are interested in promoting sanitary science.

2. *Objects.*—The objects of the Association are—by means of social intercourse and communication with each other, the reading of papers and exchange of experience on sanitary matters—to enable its members to acquire a more extended knowledge of the best methods of inspection and mode of procedure in dealing with nuisances injurious to health, and of carrying out the provision of any act, bye-law, or regulation in force, which it is the duty of a Sanitary Officer to take cognisance of.

3. *Admission of Members.*—Any person desirous of becoming a member may make application to the Secretary for that purpose, and on satisfactory proof being given of the candidate's eligibility under Rule 1, he shall be admitted a member, and the Secretary shall notify the same to him, and furnish him with a copy of the Rules, for which he shall be charged 2d., and upon payment of his subscription he shall be entitled to all the privileges of the Association.

4. *Subscription.*—The amount of subscription shall be 2s. 6d. per annum, due and payable in advance, and calculated from the date of the member's entrance. Any member whose subscription is over six months due shall be subject to fine or removal by the Executive Committee, such removal in no way affecting his liability for payment of arrears. No member shall withdraw from the Association unless he gives notice in writing of his intention to do so to the Secretary before the end of the current year of his membership.

5. *Officers.*—The Executive Committee shall consist of a President, Secretary, Treasurer, and three Committeemen. There shall also be elected two Auditors, who shall audit the accounts of the Association and see that they are correctly kept, and report thereon to the annual meeting, such report to be given prior to the election of officers. The election of officers shall take place at the annual meeting in April of each year; in the case of vacancies arising from any cause, the same may be filled up at the next general meeting.

6. *General Meetings.*—The ordinary general meetings

be held quarterly, viz., on the first Saturday in ary, April, July, and October, at 3 p.m. The circulars ening any meeting shall specify the business to be ght forward. Special meetings may be convened by President and Secretary jointly, or by requisition signed ny five members of the Association, specifying the ness to be brought forward, and the Secretary on ipt of such requisition shall forthwith issue the neces- circulars convening the meeting. No meeting shall eed to transact any business unless there be a quorum ve members present. Any meeting may be continued djournment.

Expulsion of Members.—In the event of any complaint g laid before the Executive Committee concerning the onduct of any member, or whenever there shall appear cient cause for the removal of a member from the ociation, the Executive Committee shall have power to stigate the same, and to erase his name from the list of nbers, and thereupon he shall cease to be a member.

Making or Altering Rules.—No new Rule shall be le, nor any of the Rules herein contained or hereafter e made shall be annulled, altered, or rescinded, unless the vote of a majority of the members present at a eral meeting of the Association specially called for that pose, notice whereof shall be given as per Rule 6.

R. BLAXALL ON THE DUTIES OF A MEDICAL OFFICER OF HEALTH.

a recent special meeting of the Tavistock Rural itary Authority, Dr. Blaxall, one of the Inspectors of Local Government Board, discoursed at considerable th upon the duties of a Medical Officer of Health, and importance of the office. He referred to the manner hich different diseases are propagated, and he said he ed forward to the time when, if the Medical Officers ealth fulfilled their duties, the scourges of cholera and other contagious and infectious disorders would be n from the country. When the Medical Officer of h had advised an Authority of measures to prevent ccurrence of disease, the Authority, if wise, would be l by the Medical Officer of Health, who, having got t hy district, would by systematic inspection endeavour p it wholesome. Having thus spoken generally of ties of the office, Dr. Blaxall went on to say that e criticism was an unpleasant duty, but his brother al men in that district, would, he knew, credit him ot desiring to criticise in an unfriendly spirit; and if l to speak of them in their curative practice, he be able to testify to their skill and devotion. Un- tely, he had now to speak of them as preventive s, and in that respect they had signally failed, for they t really performed any of the duties to which he had d as belonging to Medical Officers of Health. In t place they had not made themselves acquainted e sanitary condition of their districts; they had not any systematic inspection of them. They might s a certain knowledge of the district by going into lages on their regular routine duties, but that was ufficient knowledge to enable them to carry out the of a Medical Officer of Health. They had not made elves acquainted with the Public Health Acts. He Blaxall) had found out they had none of them seen a f those Acts, but one; and that one said he had read e provisions of those Acts in two nights. Another, Northey, positively didn't even know of the existence Parochial Committee for that parish of Tavistock. seemed hardly credible, but it was a fact.

w, what should be the relation between the Parochial mittee and the Medical Officer of Health. Their tary Authority could only meet at distant periods, and, e meantime, the Parochial Committee had important inistrative duties devolving upon them. Supposing a of infectious disease were introduced, and the Medical er of Health were a somewhat timid man, and did not to take the responsibility upon himself, he had the Parochial Committee to apply to. But in this case the Medical Officer of Health did not know of the existence of a Parochial Committee. Again, when disease had occurred in their districts, the Medical Officers of Health had not traced out the origin and the manner or spreading of that disease, as their reports showed. The Board knew the character of those monthly reports. They were stereotyped in their expressions. They simply stated that 'scarlet fever is prevalent', or that 'there is no infectious disorder, and therefore nothing to report.' Such statements conveyed no information, and did not afford the Board the advice they required for the administration of the Public Health Act. He might mention the report of Mr. Doidge, who said measles was stalking through his district. That was not a very scientific manner of reporting. In another report the same officer had said scarlet fever was due to a man cleaning out cesspools; but no Medical Officer of Health had a right to attribute disease to some sanitary evil without giving his reasons for so doing. In sanitary science they must have evidence as to the linking cause and effect before they could act. Again, another Medical Officer of Health reported that the sanitary condition of his district was satisfactory, but that he had a certain number of cases of typhoid. In that case, he knew, the Authority required further information upon the point. Then came the reply that that disease was existing; that one or two cases had proved fatal; and that it was due to insanitary conditions within and without the dwellings. But there was no practical information in that, and it was very unsatisfactory for the Medical Officer of Health to have to report that typhoid was due to such insanitary conditions. It was his duty to advise the Authority to remedy all such evils. Then, if the Authority neglected to carry out such advice after such information, a very serious and heavy responsibility devolved upon the Authority. It must be painful to an Authority to see cases of typhoid in their district, when they reflected that it was within their power to prevent them if they carried out the provisions of the Public Health Act. If the Medical Officers of Health advised the Authority clearly and distinctly on these matters then the responsibility rested with the Authority if the Authority did not carry that advice out. But unless the Authority were so advised, they could not act. There had been cases of diphtheria in one district, but no attempt had been made to prevent it spreading. In one case he found milk for sale in one room, and children suffering from diphtheria in another, and there had been no directions given as to guarding that milk. There was no evidence that the milk was specifically contaminated, but there was great danger of it. There were other reports of the same character as he had described. In one the Medical Officer of Health declared the water-supply of a certain place to be satisfactory in quantity and quality, while shortly afterwards he declared that typhoid fever, which had broken out, was due to polluted water. That was not placing the Authority in a proper position. If the officer reported the water good they had his opinion; but if, immediately afterwards, he came to them and told them typhoid fever was due to that polluted water, the Authority must lose confidence in his statements.

As to the instructions given to the Medical Officers of Health, they were quite clear upon all those points. These officers had not been employed without full and clear instructions from the Local Government Board; but there had been manifested throughout an entire want of appreciation of the importance of those duties, and the responsibilities of those duties, and the nature of those duties, in each of the points he had mentioned. With regard to these officers, they were all exceedingly courteous to him; but with reference to their duties, one gentleman said he hadn't the time to make a systematic inspection, and another gentleman said he would be very glad indeed to be clear of the duties altogether. Another said he would be very glad to see a man appointed for the whole district. They felt their duties were distasteful to them, and would rather be quit of them; but beyond that they all spoke of the remuneration. Now, here was a point which was of a very serious consideration, because one might take the amount

of remuneration paid to these officers as an estimate of the importance the Authority attached to their duties; and if that were so, their estimation of the duties must be very low indeed, for their officers received salaries ranging from £4 10s. to £12. It was impossible they could have rated the duties he had mentioned in a monetary point of view at their true value. But probably they were not aware that it was necessary the Medical Officer of Health should devote so much time to his duties, and possess so much special skill and knowledge to carry them on. Having mentioned these matters, he thought he had now impressed upon them the responsibilities of the duties devolving upon them, but he should not fulfil his mission unless he endeavoured to help them out of the difficulties he had brought them face to face with. It was clear they wanted, to secure the services of an efficient Medical Officer of Health, who would carry out the duties in that district; and why did he say they wanted such an officer? They must not think they had no need of such services, for the table of mortality showed that in each of the last twelve years they had had typhoid fever fatal to a considerable extent; two serious epidemics in 1874 and 1878, and deaths from scarlet fever, diphtheria, and fever; so that the mortality of their district had been very considerably increased by preventible diseases. There had been in all 154 deaths from typhoid in the twelve years. That represented 1,600 cases of suffering from a dangerous disease. Leaving alone the suffering entailed, and taking only the monetary cost of those 1,600 cases, it would amount to a very heavy sum. Putting it at the lowest average, the cost must have been £4 or £5 a case, and that would mean an expenditure of something like £6,000, or an average of about £500 a year.

There were certain ways by which they could secure the services of such a man. They might appoint a man for the whole district, and require him to devote his whole time to the work. If they did that, they would have the duties carried out thoroughly and efficiently. This would be an expensive way, because they would have to pay such a man sufficiently to enable him to fill such a position as a professional man should move in. There was another way—that of amalgamating with other districts; but it was not very often they could get other districts to amalgamate with them. A man also who was appointed for so large a district would not be able to exercise efficient supervision over the whole area.

Another method was that of dividing the district into sub-districts, as they had done in that Union; but there was a want of cohesion, of unanimity, in that arrangement, which prevented its efficient working. One officer did not know what diseases were existing in the district of the other; and in this case there had been no personal communication between these Medical Officers of Health and the Authority. They should direct such an officer as the Medical Officer of Health to attend the meetings of the Authority. There was one other course, and one which commended itself to him (Dr. Blaxall)—that was to appoint a man for the whole district, and enable him to practise in the district. He was perfectly convinced that such an officer would be able to do his duty to their satisfaction and to the benefit of the public. Therefore, that was the mode of appointment he would suggest they should carry out. But to do this they must show their appreciation of the value of the office by offering such a salary as would remunerate a man for the special knowledge he should possess, and the time he should devote to the duties. Unless they did that, they would never be able to secure the services of an efficient man; and unless the duties were carried out efficiently, there was no economy in paying for them at all. The money they had spent had been small in comparison to what they might have spent; but, inasmuch as it had not secured the object aimed at, there had been no economy in it. There had been no preventive measures worthy of the name. Wherever any epidemic disease had made its appearance, it had spread simply for the want of any such measures. He should advise them to appoint one Medical Officer of Health for the whole district, allow him to practise, and give him a salary of £200 or £250 a year, and if they had the duties of that office efficiently discharged, they would reduce the sickness and mortality of the district.

The Surgeon-General of the United States Navy, in a circular letter, calls attention to the subject of the desirability of the establishment of a National Museum of Hygiene at Washington. The museum (says the *American Sanitary Engineer*) is designed to illustrate the progress made in this country in all departments of hygiene; and architects, manufacturers, physicians, inventors, and others interested, are desired to contribute to the collection articles, models, drawings, or descriptions of any appliances or methods for improving the general sanitary condition. The museum has been made the central depository of the American Public Health Association.

CHEAP ANTISEPTICS AND DISINFECTANTS.—Prof. Bolstein has made comparative experiments with disinfectants to determine their relative value as such. He arrives at the conclusion (*Pharm. Centralb. from Deutsche Vierteljahrschaft*) that aluminum sulphate is an effective and at the same time the cheapest substance arresting putrefaction. If sufficient time is given for its action (two or three days) a four per cent. solution will effect more than a fifteen per cent. solution of ferrous sulphate, thereby counter-balancing any difference in price in favour of the latter. A very crude article might also be manufactured from clay and sulphuric acid, which would be very cheap indeed. A four per cent. solution of aluminum sulphate will kill all infusorial life, no matter how tenacious. However, this substance has no power of destroying putrid odours, and for this, carbolic acid seems to be the only available article. The author inclines to the belief that this disinfectant does not merely supplant foul odours by its own, but that the phenol enters into actual combination with the skatol of the fæcal effluvia. He therefore recommends aluminum sulphate, combined with a little phenol, as the most effectual as well as economical for rendering decaying organic substances both odourless and innocuous.

Professor Barff's new antiseptic consists of glycerine with boracic acid, in the proportion of ninety-two parts of the former to sixty-two of the latter. Prolonged heat, a little short of the boiling point of glycerine, is necessary to dissolve the boracic acid; on cooling, the substance is a tough deliquescent mass, soluble in water and in alcohol. It is a new chemical compound, named by the patentee boroglyceride, and is a powerful antiseptic. For general purposes a solution of one part to forty parts of water is recommended.

Mr. R. H. Wood, J.P., of Penrhos House, Rugby, has announced his intention to provide a site on which to build a new hospital for 30 beds, and endow it, for the use of the poor of Rugby and neighbourhood. The value of the gift will be from £25,000 to £30,000.

The Legislature of Ohio have passed what is known as the 'Cleveland Smoke Bill'. It grants, to 'cities of the first class,' 'the power to regulate and compel the consumption of smoke emitted by the burning of coal, and to prevent injury and annoyance from the same'.

An exhibition of designs and models of school buildings, furniture, and apparatus will open in Paris on the 1st June. Twenty-one prizes of from 500fr. to 10,000fr. each will be awarded, besides honorary mentions.

Messrs. Robert Boyle and Son, of 64, Holborn Viaduct, are at present applying their Air-Pump Ventilators and complete system of ventilation to the Council Chamber at Guildhall, and in accordance with their usual custom when undertaking the ventilation of large public buildings, have guaranteed complete success. Messrs. Boyle's system of ventilation is also being applied to Normanhurst Court, Sir Thomas Brassey, M.P.'s residence, at Battle, Sussex.

The inhabitants of Keswick have acquired a public recreation ground by the purchase of Fitz Park, an area of twenty-one acres, for the sum of £5,000, and an adjacent field of six acres at the price of £1,800. Towards the purchase of this ground the Messrs. Hewetson of Keswick have contributed the munificent proportion of £2,000.

ELECTRIC EXHIBITION AT THE CRYSTAL PALACE.

th this Exhibition has been pronounced in full order. No person can attempt to deny the power ity of the electric light, yet opinions are strongly upon its benefits, and whatever may be its future, certain that at the present time it is very far from rfect, and when we consider the great amount of ower required for its generation, the wear and tear inery owing to the great speed necessary, the cost of the plant, the depreciation, which has been d by a competent authority to be not less than 15 r cent., the carbons, and the daily labour necessary nming the lamps, etc., and other items to be taken ount, it must be clear to any unprejudiced mind ost must be very great. This impression is further l by the reticence displayed on the part of those d with electric lighting to enter into this part of ct. It is said that omnibus drivers and others in apacities object strongly to this light, and as we all effect of a powerful light when projected upon us, g or driving, it is not at all improbable that it may e dangers of the streets. As an indoor light its es are more apparent than for outdoor purposes, that it can be supplied at a reasonable price. The of heat and the non-generation of carbonic acid, are no small advantages over gas, when we con- injury to hangings, pictures, and books, from the e latter medium. But before this can be accom- a great deal has to be done. That electricians forth their utmost strength at this Exhibition is to every visitor, but we can scarcely look at a tion of it without feeling that this method of light- ly adapted to the wants of a few, and that few must who are prepared to go to considerable expence ng out their ideas.

Anglo-American Brush Light Company, Belvedere ambeth, are located in the Tropical Department, nes (Robey's), which present an aggregate of 125 wer and generators, being located in a specially acture on the North Lawns. The arc lamps are ircuits of 16 and 40 lights each of 2,000 candles- at their maximum. On the average about one wer is required to produce each light, or in the of 40 lights from 35 to 40 horse-power is used. A king object of the Exhibition is the great arc light 00 candles-power shown by this company, suitable houses, signalling, etc. In this department are e seen various specimens of the Lane-Fox incan- lights, which give a nice mellow light, and are for chandeliers, brackets, etc., provision being r turning them off with as much ease as gas.

South End of the Palace are the exhibits of Messrs. , Bros., and Company, 12, Queen Anne's Gate, nster, amongst them being the six-light chandelier as exhibited at the Exhibition in Paris. The lights d with globes, weather-covers, etc., showing their on for street lighting and other purposes. These ay be worked by continuous or alternate currents, ircuits of several lights an automatic arrangement d to shut off any one of them. With the alternate machine it is said that six horse-power will supply hts, eleven horse-power eighteen lights, and twenty- se-power thirty-two lamps; from this it appears cost of application and the power required to work nens' light is less than that of some systems.

Concert-room and Entertainment Court are lit with l-known incandescent lamps of Professor T. A. From the centre of the former room is suspended chandelier, and festoons of lamps are hung round ery, while in the court it is shown in the many and forms to which it is adaptable for all domestic s. By a complex system strongly resembling the of gas, an area of about one square mile may be lit central station, from which the wires are conducted pipes along the streets, and diverging at 'junction boxes' pass through the houses, thence through meters to the various positions required; it is also claimed that perfect immunity from fire and accident is secured.

The Swan Electric Light Company, Newcastle-on-Tyne, exhibit their incandescent lamps, they being arranged in the Picture Gallery, and produce a good effect, and like some other systems the lights can be turned off separately if desired.

R. C. Cutting and Company, Queen Victoria Street, show a model illustrative of their patent lightning conductors; they also exhibit Cox's telephone transmitter and receiver, but these important specialities will be further adverted to in the articles upon 'Building Appliances', which will appear in the course of the current year in the SANITARY RECORD.

The Hammond Electric Light and Power Supply Company, 110, Cannon Street; the Electric Light and Power Generator Company, 47, Cannon Street; the Compton System, Mansion House Buildings; and the celebrated Jablochkoff candle exhibited by La Compagnie Générale d'Electricité, 139, Cannon Street, illuminate various parts of the palace with their respective lights.

Messrs. John Warner and Sons, the eminent hydraulic and sanitary engineers and bell founders, of the Crescent Foundry, Cripplegate, have a select exhibit of brass-work of their manufacture, both nickel and silver plated by Elmore's dynamo-electric machine. There is also a set of musical hall bells of exquisite tone also nickel-plated, and a large bell fitted with electro magnet and spring hammer for fixing at sea upon a float or light-ship, to warn vessels in foggy weather. By the arrangement of this bell, it can be rung either from a lighthouse or from land, and must prove a veritable boon to the mariner. This mode can also be adapted to a set of church bells for chiming, etc., no exertion whatever being necessary, and will open up quite a new feature in this direction. In the engineering department, they exhibit a small steam-engine for working treble pumps, or for driving dynamo machines for electric lighting. Another very commendable feature of Messrs. Warner and Sons' manufacture, is their Patent Annular Sail Wind Engines, admirably adapted to raise water for generating electricity, and offers a very economical and efficient arrangement for this purpose, particularly for country mansions, factories, water-works, etc. The apparatus can, in addition, be connected with their Vertical Combined Multitubular Boiler and Steam Engine. Cutler's Patent Turbines manufactured by this firm, are of improved construction, and may be utilised for the same (and many other) purposes as the annular sail wind engines, and on a farm where water in sufficient quantity exists, may be made to accomplish all that the steam engine would otherwise effect. Referring, again, to the pumping machinery made by this firm, it is manufactured for every description of use, from the simple house-pump, to the most elaborate sets for the largest mines, sewage, or water-works, and are in use in numerous towns in England as well as abroad.

(*To be continued.*)

THE SPORTSMAN'S EXHIBITION.

A DISPLAY bearing the above title, and which, we understand, it is intended to continue annually, was held at the Agricultural Hall last month, and may fairly be pronounced a success. Properly designated, this was an exhibition of sporting appliances; in which cricket, football, polo, lawn tennis, archery, shooting, fishing, hunting, racing, boating, etc., were all more or less represented. Another feature that aided materially to swell the numbers of the exhibits, and in reality formed an exhibition of itself, was the display of bicycles and tricycles, which alone filled the galleries. The Stanley Bicycle Club, who have for the last three or four years held a separate exhibition at the Holborn Town Hall, determined, at the suggestion of the Committee, to throw in their lot with this undertaking. If any of those 'intelligent foreigners' who are under the impression that we take our pleasures sadly, were amongst the visitors, they must certainly have thought that we not only throw a large amount of method into our sadness, but

that we spend large sums of money in endeavouring to secure the best and most perfect appliances with which to carry on our usual recreations, and must have left the building with different ideas to those which may have been in their minds when they entered it.

Bicycles we shall pass over, with the remark that the collection was of the best character, but it is quite evident that the manufacturers of these machines are becoming more alive to the necessity of cultivating the growing feeling in favour of tricycles. Our own views on this question are expressed in the article upon tricycling, which appeared in the January number of the SANITARY RECORD, and has, we have reason to know, already assisted to develop their employment. Any person who feels interested in the question, and may not have seen the paper to which we allude, may obtain a copy on application to Messrs. Smith, Elder, and Co., 15, Waterloo Place, S.W.

In the machines of Messrs. Maynard, Harris, and Co., 126, Leadenhall Street, the most attractive novelty in tricycles is the 'Special Devon', which is an undoubted improvement upon last year's model, good even as that was. Among its important points, is the patent adjustable hill-balancing gear, which entirely obviates the necessity of leaning forward in order to mount a steep ascent, so usual in most ordinary tricycles; and to retain his balance the rider need not add any strain on the front wheel, as by moving a lever close to the saddle the pedals go back, and the saddle is brought proportionately forward, the result being that he remains in a comfortable and natural position.

Messrs. Hydes and Wigful, Limited, of Sheffield, and Praed Street, London, showed several of their well-known 'Stanley', 'Chester', and 'Marmion' bicycles, some being fitted with their new registered ball-bearing head, which is a very important arrangement. Their cheapest machines are also of excellent finish. Messrs. Hydes and Wigful, will, we understand, shortly enter the lists with a newly-designed tricycle, of which we shall give details as soon as it is completed.

Another good hill-climber tricycle is the 'Newmarket', shown by Messrs. Norman Oakley and Co., 77, King William Street. In this machine, arrangements are made by improved actions for working both by hands and feet together, or separately; by a self-adjusting seat it maintains its own level over hills and rough roads, and being under perfect control and easy to work, is specially suited to ladies and invalids.

The National Arms and Ammunition Co., Limited, of Birmingham, have devoted a portion of their splendid plant to the manufacture of these useful articles of locomotion, conspicuous among their exhibits being the 'National' tricycle, the particular feature of which is the patent differential double driving gear. This is a very capital arrangement, which cannot fail to be appreciated, its object being to facilitate turning sharp curves. This it does with extraordinary ease, as a perfect distribution of the power transmitted from the pedal cranks to the two driving wheels is maintained, in whatever direction the machine be driven, whether forward, backward, or curvilinearly. The 'National' bicycle made by this firm, also has important features, and the general build and construction, in common with their other machines, indicate that only the best materials and workmanship are employed in their manufacture.

The Royal Machine Manufacturing Co., Limited, of Small Heath, Birmingham, had a very creditable show of their noted tricycles, which they have aptly named 'Royal Mail', as, though having a decided appearance of strength about them, they yet run easily and swiftly, while provision is made for attaching an ample valise or basket to the back part—a very desirable object. These machines are finished in the best possible manner, the Company being of high standing as makers of goods of a kindred nature, which have no unnecessary embellishments, and other qualities that preeminently fit them for hard work.

The Patent 'Rapid' Tricycle manufactured by the St. George's Foundry Co., Pope Street, Birmingham, is a very ingeniously constructed machine, and though comparatively new, must soon become very popular, especially as a hill-climber, in which feature it is probably second to no other, while in the capacity of an ordinary roadster it stands in no mean position. The gearing for attaining these ends is of a simple but effective description, and is actuated with the utmost ease at any moment, at the will of the rider, by moving a lever conveniently situated on his right hand. The standard size of the front wheels is 40 inches, which, for hill climbing, by merely pushing the lever forward, are speeded to 27 inches, and by pulling it backwards may be speeded up to 60 inches. Thus the reserve of speed and power is quite under the rider's control. The brake power and back steering wheel are points that have not been overlooked; and for descending hills the pedals may be put out of gear, and so form rests for the feet. The firm were also exhibitors of the 'Rapid' and 'Dispatch' bicycles; which have important features peculiar to themselves, and the latter is made to meet the wants of those who require a good machine at a moderate cost.

A stand that was justly a source of great interest to bicyclists and tricyclists was that allotted to Mr. C. R. Binney, of 5, Hackney Road, E., who exhibited his newly patented 'Dutton' bicycle and tricycle. The gearing of these machines, with one exception, was totally different to anything else in the Exhibition, and as a glance at the following illustration will show, is on the ratchet

principle, which dispenses entirely with the crank motion, and has no 'dead points', while greatly increased power and speed are given to the rider without diminishing his ease and safety. The foregoing remarks refer to both kinds of machines made by this firm, and as regards the former, for those who may wish to obtain a very high rate of speed, there is undoubtedly no machine in the market so capable of satisfying their requirements as this. As before noted, this patent is of very recent date, and the tricycle is not yet quite ready for delivery; it is, however, in a sufficiently forward state to show its action, which, in addition to foot-power, may be worked by hand also, the arrangement of the latter propellers being such as to give the rider a leverage quite unprecedented. We shall on a future occasion give further particulars of it.

Messrs. T. Smith and Sons, Saltley Mills, Adderley Road, Birmingham, the well known steel toy and general tool manufacturers, have of late years, in common with other firms of a kindred nature in this metropolis of the Midlands, turned their attention to the production of bicycles and tricycles, and the names under which these machines appear are respectively the 'Viaduct' and 'Empress'. This firm has always been noted for the good material used in, and the finish bestowed upon, all articles sent out from their establishment, and the machines we are now considering are no exception to the rule. They were exhibited both at the Sydney and Melbourne Exhibitions, together with a case of every conceivable part and fitting used in the manufac-

descriptions of tricycles, and received prize

nell & Co. of Brixton Rise, S.W., exhibited tent Safety Bicycle and the 'Merlin' Tricycle. these is on the ratchet principle, but though eral points from the one previously men- ellously effective and simple.

f the Manchester Tricycle Company, 14, de, Deansgate, Manchester, was, we believe, that of the only firm who have considered the wants of invalids or those persons whose lower limbs are weak or useless. This they have done by introducing a tricycle with all modern improvements, for propulsion by the hand only, and which is at once simple, safe, and light. Arrangements are also made for adjusting it to attain either a great speed for a level road or to give power for hill-climbing. For the invaluable, and undoubtedly supplies a

The firm are manufacturers of various tricycles to be worked by either the hands

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ıber, Marriott, and Cooper, of Nottingham, ond Road, S.W., had a splendid display of wn machines, the excellence of which has tested by the number of races won by riders s. The 'Humber' Ladies Tricycle and the ycle (the latter for three persons) are admir- of style, finish, and thoughtful construction. the display was varied and numerous, and ost every description of vehicle for the horse, e cart to the four-horse drag, and from the ctoria, the manufacturers being not only but others from various parts of the country. n Land to Water, not the least interesting Exhibition was the collection of boats, a ance, if we may so term it, we are not tomed to see in such collections. Boating most healthful and pleasurable recreations is another of the means of employing our hat can be indulged in by all classes at id generally with the most satisfactory e is no reason why those who live near idently of those who reside on their banks, come possessors of their own boat, which ased for, comparatively speaking, a few who admired the symmetrical outlines and of the 'water carriages' displayed at this ld refrain from expressing a desire to become f one of them. Amongst the collection was r Canadian canoe, shown by the maker, Mr. , Bridge Street, Maidenhead, which found . Mr. John Loynes, of Norwich, a well of boats on the Yare, exhibited a model, te of 20 ft. by 7 ft. centre board, of a safety adapted for rowing or sailing and cruising in fitted with his instantaneous adjustable water-

The boat is intended to carry mattresses, ersons, with cooking and other utensils, so as ing out unnecessary to the occupants. The wn as 'Una', changeable at pleasure to fore- and mizen rig. With such a boat a small y a week or two's pleasure on any of our hat can scarcely be excelled by any other hy recreation. Mr. T. G. Tagg, of Hampton harming twenty-two foot mahogany pleasure ive persons, with gearing complete, of a class p-river purposes, giving comfort and exercise lue expenditure of labour. A North Ameri- noe called the 'Niagara' was also exhibited, modern improvements, such as patent swivel ting centre-keel to keep it steady while s, etc. A contribution from the same neigh- that of Messrs. C. and A. Burgoine, of k and Kingston-on-Thames, consisting of a very pretty sailing-gig, 15 ft. long, for racing purposes, that had been built to order; a fine mahogany skiff with fittings, 24 ft. long; a cedar gig, a most enviable boat, 23 ft. long; and a pair of Canadian pattern canoes, of their own build. They also supplemented their display with a variety of photographs and models of steam launches.

The Messrs. Searle and Sons, of Stangate, Lambeth, were also represented, the principal object being a Water Velocipede for two operators and three sitters, furnished and upholstered complete. This was a most luxurious water conveyance, the pedals by which the small paddle wheels are actuated being most easily poised, so as to offer the merest minimum of exertion to the workers. This boat attracted a large amount of attention.

Another firm of boat builders, well known in the London district, who added to the display of boats were Messrs. E. Messum and Sons of Richmond, who sent specimens of their builds known as the 'Specialité' Gentlemen's Pleasure Skiffs, a most attractive and symmetrical class of boat.

The miscellaneous exhibits were not numerous, but comprised the names of some well known makers. The most important display in this section being that of Messrs. Boulton and Paul of Norwich, who sent a most useful small building in iron, intended for a shooting-box, 18 ft. by 11 ft., but which was capable of being adapted for many accessory uses. Their collection of poultry houses was of the most complete and interesting character, and it is scarcely too much to say that they are unapproached in their class of articles. No less commendable were their dog kennels for all sizes and species of the canine race, and travelling boxes for dogs.

Messrs. Richmond and Chandler of Manchester, the extensive manufacturers of chaff-cutters, corn mills, and other food-preparing machinery, had a select assortment of their leading specialities, including their well known prize medal chaff-cutters, for which they have obtained awards at most of the International Exhibitions, as well as at numerous others held throughout the kingdom. Another firm known for making an inexpensive class of food mills that command a large sale, Messrs. R. A. Lister and Co., Dursley, Gloucestershire, were also present with a selection of these appliances, as well as some cheap chaff-cutters.

LAW REPORTS.

Charitable Bequests and the Statute of Mortmain.

The late Dr. Lambert of Bath, by his will dated October 1, 1866, gave to between thirty and forty charities various specified sums, and concluded his will with the words, 'all the above legacies and donations to be paid in stock and not in pounds sterling,' the only stocks previously referred to in the will being Great Western Railway Stock. Among the charitable bequests were, 'the sum of £2,000 to the trustees of the Fund for Improving the Dwellings of the Poor of London.'

One of the questions in dispute was, whether the character and objects of the charity for improving the Dwellings and the sanitary condition of the poor did not bring the gift to that charity within the statute of mortmain.

Vice-Chancellor Hall held that the gift to the trustees of the Fund for Improving the Dwellings and Sanitary Condition of the Poor of London was valid; his lordship observing, 'Cannot the sanitary condition of the poor be improved without violating the statutes of mortmain?'

Adulterated Butter.

At Worship Street, Mr. Enoch Walker, vestry clerk of the parish of St. Leonard, Shoreditch, appeared to support summonses taken out under the Adulteration Act, against several tradesmen in the parish for selling adulterated butter. The facts in all the cases were of the usual kind, the parish officer, Henry Fletcher, sending a person into the shops to purchase, and then following in to take possession

of the article, and state for what it had been purchased. The certificates of Dr. Stevenson, analyst of Guy's Hospital, showed that in all the cases, except one, the article supplied was adulterated with 85 per cent. of foreign fats; in another, the adulteration was 80 per cent. Mr. Walker, in the course of the case, said that the 'foreign' fats referred to were not injurious, but ought not to be sold at 1s. 4d. a pound. What was sold was 'oleomargarine', a compound largely imported from New York, a statistical journal which he (Mr. Walker) produced showing that within nine months of the year 1881 no less than 15,759,653 lbs. were exported therefrom, the major portion coming to this country. Fines of ten shillings were inflicted in each case, except one, in which it appeared that the person who served the 'butter', on finding that the parish official had bought it for analysis, threw the money back at him, and said the stuff was only sold as a 'catch'. That conduct, Mr. Hannay the magistrate considered had shown knowledge on the part of the defendant, William Banks of Pimlico Wharf, Hoxton, of the condition of the article, and he was fined 40s. and costs.

The Abatement of Smoke.

At the Yealmpton Petty Sessions, Richard Waycott, farmer, Smithaleigh, Plympton, was summoned under Sec. 30 of the Highways and Locomotives Act, 1878, for using a locomotive on the highway which did not consume its own smoke. Defendant called Mr. Charles Marshall, engineer, of Gainsborough, the maker of the engine, who gave evidence that the locomotive was furnished with a smoke-consuming apparatus, and did consume its smoke 'as far as practicable', but that some smoke must escape, especially after putting on fresh coal. Witness stated that black smoke would issue for about five minutes after putting on fresh fuel, not for a quarter of an hour; if coke were used instead of coal there would be no black smoke. It was possible to work the engine without using the smoke-consumer. The Bench were of opinion that the locomotive did not consume its smoke 'as far as practicable' on the day in question, and fined defendant £1, including costs, and advised him to use coke when travelling on the roads, and also to be particular to use the 'consumer'.

Convictions have also been obtained at Wandsworth Police Court in the case of Mr. Charles Garton, a sugar refiner, of York Place, Battersea, for using a furnace not constructed to consume the smoke. Mr. Partridge fined the defendant 5s., with £2 4s. costs. Henry Keen, a baker, of Plough Lane, Battersea, was likewise fined 5s., with £1 13s. 6d. costs, for a similar offence.

Nuisance from Gas-Works.

This was an action for an injunction to restrain the Metropolitan Railway Company from manufacturing or using gas at or near the Broadway station at Hammersmith in such a manner as to be a nuisance and injury to the plaintiff, George Duckling, and the other occupiers of houses in Brookgreen Road, Hammersmith. The defendants for some time past had manufactured gas for lighting their carriages from paraffin, petroleum, or other mineral oils, in a shed situate near the dwelling-house of the plaintiff, and in order to prepare the gas for the carriages, it was subjected to compression. It was alleged that such compression produced a liquid residuum possessing a highly offensive odour, and that the necessary removal from time to time of this residuum from the tanks was an intolerable nuisance to the plaintiff and other persons occupying houses in the immediate neighbourhood. Mr. Justice Kay said he was satisfied from the evidence that there was a considerable nuisance arising from the defendants' gas-works. Their witnesses asserted that their works were so well built that there could be no escape of noxious vapours; but no amount of evidence would prove to him that a man ought not to smell a stench which he actually did smell. It had been distinctly sworn that the vapour arising from the defendants' works was extremely injurious to vegetation; and the glutinous deposit which was stated to settle upon any water that was exposed outside the houses could not be caused by anything but the gas-works. Upon the whole evidence he was bound to grant the injunction at once, without waiting until the action was ready for hearing. He made the order asked for, but, to give the defendants an opportunity of removing the nuisance, directed that the order should not be drawn up for two months.

The Lodging-House Acts.

A woman residing in Chelsea, made a complaint before the sitting magistrate, that the police wished to register her house as a common lodging-house, subject to the provisions of the Lodging-House Acts, and liable to be visited and controlled by the police. Under the provisions of the 29 and 30 Vic., cap. 90, secs. 35 and 36, power was given to the 'sanitary authority', in this case the Vestry, to register houses where more than one family resided in one room, and a board was to be affixed to a house so registered, showing that it was a common lodging-house. The applicant urged that the fixing of such a board would probably seriously injure her reputation as a householder. Her house was not used for the reception of tramps, one man having lodged there for three and another for two and a half years; but in the rooms there were more beds than allowed under the Lodging-house Acts. Mr. D'Eyncourt thought the police were right. According to the opinion expressed by the late Lord Chief Justice of England, the period of letting was unimportant if more than one family, or separate persons, or families, lived in the same room. The applicant said she had now only two lodgers in one room, where there had been three. On behalf of the police, it was stated that the house of the applicant would not be labelled 'common lodging-house.'

Power to Inspect Premises.

At Hammersmith, Mr. Jones, clerk of the Fulham Board of Works, waited upon the magistrate with respect to an order which had been granted to enable Dr. Collier, the Medical Officer of Health, to inspect the Hammersmith Saccharine Works, as it was alleged that a great nuisance was created in the manufacture of sugar. Dr. Collier, the Medical Officer of Health, went to the works accompanied by the Inspector of Nuisances, but they were refused admission. A gentleman said, on behalf of the company, that there was no objection to the Medical Officer of Health inspecting the works, and asked for a short notice to be given to the manager; but Mr. Jones offered an objection to that arrangement. Mr. Jones said the proceedings were taken under the 18th and 19th Vict., chap. 121, section 13, which gave the local authority power to enter and inspect the premises. He asked the magistrate how the order was to be served? Mr. Paget said that was the first time in 17 years he had been a magistrate that he had been called upon to exercise the power, but he thought the order should be given to the local authority. Sergeant Cornwall informed the magistrate that in some cases heard before Sir James Ingham at that court orders were given to the Sanitary Inspector of Kensington, who, with the Medical Officer of Health, obtained the assistance of the police while they broke into certain premises to look for pigs. Mr. Jones said it was not intended to break into the premises in this case. Mr. Paget signed the order, which was handed to Mr. Jones for execution.

Bone-Boiling Nuisance.

This was a motion to restrain the defendant from carrying on the business of a bone boiler so as to occasion a nuisance. The plaintiffs, Messrs. Verco and others, are tenants, under a four years' agreement, of houses which have been lately erected on the Mill-hill Park Estate, Acton. They complain that their houses are rendered uninhabitable in consequence of the smell coming from the defendant's premises, which are situated about 100 yards off. It was alleged that the defendant was in the habit of collecting from marine store dealers and butchers quantities of fat and bone, which were kept

for a time in his yard, and then boiled down in large vats. The plaintiff entered into possession of his house in June last, and soon after was taken ill, and obliged to go away to Torquay. On returning, he was again taken ill, and again obliged to go away. For the defendant, Mr. Morris, it was stated that the works had been in existence for twelve years, and the affidavits which were read stated that, in the opinion of the deponents, the works caused no nuisance; but that even if there was a nuisance, the defendant was, in consequence of proceedings taken by the Local Board, engaged in erecting a shaft which, he believed, would remedy any nuisance there might be.

The Judge, Mr. Justice Chitty, came to the conclusion that the plaintiff had proved a case of intolerable nuisance. The injunction asked for must go, but would be suspended for a month, in order that the defendant might devise some mode of carrying on operations in a manner which was not objectionable.

BRIEF NOTES OF USEFUL CASES.

NUISANCE.

1881. *Banbury Sanitary A.* v. *Page.* "Public Health Act, 1875," s. 47—Pigs evidently kept so as to be a nuisance—Proof of injury to health not necessary in order to sustain a conviction so long as there is a "nuisance" in the Common Law meaning of the term. (51 L.J., M.C., 21; L.R., 8 Q.B.D., 97; 45 L.T., 759; 46 J.P., 4.)

SEWER.

1881. *Dudley Corporation, In re.* "Public Health Act, 1875," ss. 15, 16, 175, 308—A Local Authority taking a sewer through private lands is entitled to subjacent support for such sewer, but must compensate the landowner for the consequent interference with his freedom to work minerals lying underneath—But compensation not payable for prospective injury by percolation. (51 L.J., Q.B.D., 121; L.R., 8 Q.B.D., 86; [Dudley Mayor *v.* Dudley Trustees] 45 L.T., 733.)

RATES.

1881. *Hare* v. *Putney Churchwardens.* Bridge transferred from a Company to Metropolitan Board of Works—Held that the Company was liable for the whole of the Rates remaining unpaid at the date of the transfer, there being no succeeding occupier liable for Rates on whom a proportional part of the Rates could be levied, the Board of Works being an occupier not liable to pay Rates. (50 L.J., M.C., 81; L.R., 7 Q.B.D., 223; 45 L.T., 337; 46 J.P., 100.)

LOCOMOTIVES IN STREETS.

1881. *London and South Western Railway Co.* v. *Myers*—Tramway along street—Held that to use a locomotive on the same was a breach of the "Locomotive Acts," notwithstanding that the tramway itself had been constructed under Parliamentary Powers. (45 J.P., 452.)

TRAFFIC ON HIGHWAYS.

1881. *Pickering H. B.* v. *Barry.* "Highway Act, 1878," s. 23. Heavy traffic in bricks carted for building a house—Such traffic held not "extraordinary"—*Per* Lopes, J.:—"(excessive weight) was something unusual in weight: (extraordinary traffic) was something unusual in the kind of traffic. I think that the legislature intended something unusual in weight or extraordinary in kind of traffic, either as compared with what is usually carried over roads of the same nature in the neighbourhood, or as compared with what the road in its ordinary and fair use might be reasonably subjected to. It would not be sufficient to compare the weight and traffic complained of with traffic usually carried on the particular road. It might be the traffic was usually of the lightest kind, but surely the legislature never intended that a man was not to use the road for carrying materials for building a dwelling-house, farm-house, or a barn, provided he used it in a reasonable way for those purposes." (51 L.J., M.C., 17; L.R., 8 Q.B.D., 59; 45 L.T., 655; 45 J.P., 812; *Times*, Dec. 2, 1881.)

REPAIR OF BRIDGE.

1881. *Reg.* v. *Dorset Inhabitants.* Toll Bridge built within Municipal Borough—On expiration of Turnpike Trust held that, under 33 & 34 Vict., c. 73, s. 12, the County became liable to repair the bridge, unless it could be shown that the Borough was liable by immemorial usage to repair all bridges within its boundaries. (45 L.T., 308.)

RATE IN RESPECT OF A NUISANCE.

1858. *Reg.* v. *Middleton Nuisances Committee.* The time within which an appeal must be brought against a Rate runs from the time when notice of the assessment was given to the appellant, not from the time when the Rate was made. (28 L.J., M.C., 41; 1 E. & E., 98; 32 L.T., (o. s.) 124.)

SURVEYOR'S CERTIFICATE.

1881. *White* v. *Colston.* "Extraordinary traffic" during year ending March 1880—Surveyor's certificate of expenses given in February 1881, and information laid in April following—Held that the six months' limitation ran from the demand for payment, and not from the happening of the mischief. (45 J.P., 765.)

REVIEWS.

Naval Hygiene. By J. D. MACDONALD, M.D., F.R.S., R.N., ex-Professor at Netley. London: Smith, Elder, and Co. 1881.

CONSIDERING the immense number of human beings, whether emigrants, passengers, or professional sailors, who are afloat at any given moment, it is a matter of surprise that some such volume as the above has not appeared long ago in this country. Both Dr. Lind and Sir Gilbert Blane, indeed, in the opening years of this century wrote ably and originally on the hygiene of ship life. Later on, Dr. Sanders and Sir Alexander Armstrong both published 'Hints and Observations' on naval hygiene, with special reference to scurvy. Their works appeared respectively in 1856 and 1858, and since then, except for the 'Annual Reports of the Health of the Navy', it may be said that almost nothing has been contributed by English writers to this immensely important subject. This is the more remarkable, in that it has attracted considerable attention both in the United States and in France. The work, therefore, of Dr. Macdonald, may be said to fill a *lacuna* which has existed too long already in English literature. In this book he has applied sanitary science in its latest development to ships both wooden and iron. He has attempted, with great success, to solve the extremely difficult problem of the ventilation of ironclads, such as the *Devastation* and *Glatton*, in which the conditions of existence would seem at first sight to be almost intolerable. In these ships, of course all other considerations have necessarily been subordinated to the chief one of fighting. In their peculiar construction, their vast size, and the great number of men they carry, they offer difficulties in the way of scientific ventilation, which neither the older sailing ship nor the modern steamboat offer in anything like the same degree. With Dr. Macdonald we agree, in thinking that ventilation is quite as important to the health of passengers and crew as either good food or good water. It is one of the factors which go to make up a 'healthy ship', and, as such, deserves far more attention, both from sailors and naval architects, than it has in many cases hitherto received.

Dr. Macdonald prefaces his introduction to the subject of naval hygiene, properly so called, by a concise, but sufficiently full account of the anatomy, if the expression can pass, of a ship. He describes and illustrates her intimate structure in a series of excellently drawn woodcuts. These render much more intelligible to the ordinary reader than they might otherwise be, his subsequent comparisons between the advantages of the two great systems of ventilation, the *plenum* and the *vacuum*. These have both in

principle been recognised for considerably more than a century. The fan which Desagulier brought under the notice of the Admiralty so long ago as 1734, is in all essential respects the fan which to-day renders such good service as a means of *plenum* ventilation. The difficulty the early inventors had to contend with was the want of sufficient motor power. It is only since the introduction of steam, that the plenum system can really be said to have had a fair trial. It is at its best both complicated and expensive, but it will apparently do for modern ironclads, with their double bottoms and low 'tween decks, what no other system will, that is, keep them fairly fresh and sweet. Doubtless, for all merchant vessels the vacuum system is at once the cheapest, most practical, and most effective. Dr. Macdonald illustrates very clearly, both in his drawings and in his pages, the respective value of the various appliances used on board ship to secure a proper supply of fresh air. Space prevents our describing these in detail, and we must leave them with the remark, that they will amply repay careful study by anyone interested in modern ship construction, whether he be a medical man or a sanitarian.

After treating with commendable fulness the whole subject of ventilation, the author passes on to those of water and food. He describes in detail the various methods of testing the purity of potable water, dwelling at considerable length on Dr. Normandy's distilling apparatus. There is, probably, no single measure which has tended so much to increase the health of Her Majesty's ships, as that of supplying the ship's company with distilled water. Those who have ever witnessed the old-fashioned process of 'watering' a ship from some diminutive tropical stream, charged with every species of decaying organic matter, will readily understand why this is so. Of equal importance is the food-supply, and judging from the statistics which Dr. Macdonald gives, this was for many years in the navy in a most unsatisfactory condition. Dr. Cockburn, Physician of the Fleet, wrote on the subject so long ago as 1696, but his criticisms and suggestions appear to have been passed over by the then Lords of the Admiralty, as being, probably, beneath their notice. But at various periods subsequently to that date, especially about the time of the mutiny at the Nore, the sick lists in the navy had assumed such portentous lengths, that admirals and captains could no longer shut their eyes to an evil which was gradually assuming alarming proportions. The ordinary rations allowed at the present day surpass those allowed to the sick in 1800, but even the present scale of diet in the navy is not quite what it might be. Compared to that in merchant sailing vessels, it appears deficient both somewhat in variety and quantity. On the other hand, it may be said (and this is certainly true), that the dietary scale enacted by the Merchant Shipping Act is, at least for passengers, too liberal. Much less salt beef and pork, and perhaps, a ration or two extra of preserved vegetables, or of tinned meat, would keep emigrants both in better health and in better temper, especially when traversing low latitudes.

Under the heading of Prophylactic Hygiene, Dr. Macdonald considers such important matters as re-vaccination, the value of lime-juice as an anti-scorbutic, the issue of quinine in malarious districts, the influence of the type of ship on the crew, and the importance of constant attention to cleanliness and dryness 'tween decks. This last item is of paramount importance. In many of the emigrant ships employed in the New Zealand Government Service, it used to be customary, and is perhaps still so, to wash the lower decks twice a week. The consequence was they were never dry, a state of things about as prejudicial to health as could well be imagined. Dr. Macdonald gives some remarkable instances in ships of war of the bad results of this practice, which, as he justly observes, should seldom or never be resorted to. Warm sand is at once the healthiest and best means of cleansing a ship's lower decks. If this fail, scraping may be resorted to. Almost anything is better than washing a wooden deck, immediately above which men have to eat and sleep.

The concluding portion of Dr. Macdonald's work contains a carefully arranged appendix of practical hints on the *management* of seamen, and the daily routine of ship life. He touches on the duties of Medical Officers afloat, quotes the Admiralty Medical Instructions, and supplements them by the United States Passenger Act of 1880. With these he closes a volume which, within its limits, admirably supplies a want long felt. It gives concisely and accurately, just what a ship surgeon requires to know, and we are not acquainted with any work which gives this so well. While not challenging a comparison with the larger treatises of Parkes and others, it is for all practical purposes quite full enough. If we have any fault to find with the work at all, it is that the author should have limited his remarks almost entirely to ships of the Royal Navy. Of course, no critic has any right to find fault with an author for having chosen his own limits, and worked well within them. Nevertheless, a hope may be expressed that should, as is almost certain, a second edition of this manual be called for, Dr. Macdonald may be induced to turn his attention in it to some points in the berthing, feeding, and general hygienic management of the immense shiploads of passengers who now cross the Atlantic every week. If he will examine some points in the economy of ocean passenger ships with the same practical knowledge and painstaking industry which he has brought to bear on Her Majesty's ships, he will render an important and valuable service, not only to members of his own profession, but to large numbers of the general public.

Sell's Philosophy of Advertising. HENRY SELL, Bolt Court, London.

OF late years, the practice of advertising has obtained a large extension in the mercantile world. Some years ago, firms of repute thought it somewhat *infra dig.* to let the public know by this means where their goods were to be obtained, relying on private recommendation and the reputation they had acquired for the excellence of their wares. This feeling has now, however, all but entirely passed away. The fierce competition of modern trading, the means of comparison of the prices of goods afforded by the co-operative stores with their fixed rates of profits, the multiplication of low-priced newspapers, and, consequently, of readers, and perhaps the example of transatlantic traders, with whom advertising is at fever-heat, have convinced many of the firms who would have scornfully repudiated the notion of appealing to public favour by such means 'when George the Third was King', that if they would not be hopelessly distanced by their more enterprising rivals, they must make known to a discerning public the nature and prices of the wares they have to offer for sale. Consequently, we now see the columns of the daily and weekly journals filled with advertisements from the most aristocratic firms of jewellers, drapers, upholsterers, and, in fact, manufacturers and traders of all kinds, to the unquestionable convenience of purchasers, and doubtless the profit of vendors. In the introductory chapter of his little work on advertising, Mr. Sell adverts to the advantages we have indicated in relation to buyer and seller, and then proceeds to point out the best and most practical way of expending a given sum of money, large or small, in giving publicity to the special advantages offered to the public by the advertiser. He further supplies lists of advertising media and specimens of advertisements, rendering his little volume an useful guide to those who intend to introduce themselves and their wares to the notice of an ever-buying public.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

APPOINTMENT AND TENURE OF OFFICE OF INSPECTORS OF NUISANCES.

The above subject is of very great interest to all holding one of these appointments in both urban and rural districts; I am therefore pleased to see the matter being taken up in the columns of your Journal, and trust some practical and

ıl results may follow. In order that this may be ished, I would suggest that every Inspector should mself as a member of an existing Inspector's Asso- ' or combine with others and form such, remem- hat the old maxim says, ' Unity is Strength', and ɔgether, our object might be attained.

uld be very desirable if you could ascertain for us, ·lish, the names of such associations; personally, I f three, which are the 'Western Counties', the and Neighbouring Counties', and that at Birming- ntioned by your correspondent; but no doubt there ral others. Perhaps those of your readers who such associations will kindly give in the names of you. In this case, a resolution framed to assist in the co-operation of all might be adopted, and a on formed to wait upon the President or the per- Secretary of the Local Government Board, and ex- r views, which should be in the first place, to make ɔintment of Inspector of Nuisances of a more per- character. From Mr. Rawlinson's late utterances, e easily seen he would support the movement.

needless to state what risk we run of losing our ments every year or so, when the term for which appointed expires. Indeed, to me, it appears al Government Board has rather misled us, for when lic Health Act, 1872, was passed, the directions of ɔer Board were that the appointment, in the first ; should be for a period not exceeding five years, as under the impression that, if I properly performed es, my second appointment would be final. Instead one has to submit to a re-election at short periods. ıis not act in many instances as a bar to sanitary

The very men who are owners of property of the escription obtain seats upon a Local Board for the of controlling the action of the Inspector, and for ɛr to act conscientiously means, in too many s, to place himself in a very awkward position, and nbered when the term of his appointment expires. ot we get the Local Government Board to do as w consent to do in the case of Sanitary Officers in , though here they show much weakness, viz., that uthorities shall make the appointments as heretofore, es of dismissal, etc., shall be subject to appeal to al Government Board. By all means place us in a ıdependent position, so that we may fearlessly carry : duties, a matter which is now impossible. The ıs started rolling, and it rests with my brother ors to be determined. ONE OF MANY.

'IFICATION OF INFECTIOUS DISEASE.

ı time to time I have observed in your Journal nts urged in favour of and against the notification ɛtious disease.

you allow me to state that we have had ten years' nce of the working of this system in the Urban y District of Leek? The Commissioners, having no law enabling them in that behalf, in 1872 entered contract with all medical practitioners within their to forward to me a report of each case of infectious , in the form 'A' provided him in that behalf, within hours from the time of first seeing the case, the fee ɛ for each report being 2s. 6d. (two or more cases ɜame house in one month to count as one case).

(A.)

'LEEK IMPROVEMENT ACT, 1855.'
(Urban Sanitary District.)
PUBLIC HEALTH ACT, 1875, SEC. 124.
MEDICAL CERTIFICATE.

House and Name of Street.....
upier's Christian and Surname.....
I certify that.....aged.....
at the above named place, situated within the limits of the mprovement Act, 1855,' is suffering from.....being ɛrous infectious (*a*) disorder (and is without such proper odation as is necessary to insure sufficient isolation to protect lic health). (*b*)

Dated this.....day of.....188

(Signed).....

R. Farrow,
itary Inspector, Leek.

* See page 385.—ED.

(*a*) Infectious diseases apply only to Small-Pox, Scarlet Fever, Diphtheria, Cholera, Typhus, Typhoid or Enteric Fever.

(*b*) Where isolation on the premises is sufficiently complete to prevent the spread of the disease, the words in brackets must be struck out.

In the event of the medical attendant crossing out the words in brackets [.....], we serve a notice on the occupier in the form marked 'B' enclosed, and afterwards watch the case. If the bracketed words are not crossed out, the case is at once removed to the Infectious Diseases Hospital provided by the Commissioners.

(B.)

[Register No.

'THE LEEK IMPROVEMENT ACT, 1855.'
(Urban Sanitary District.)
PUBLIC HEALTH ACT, 1875.
NOTICE.

To.....

No.....Street, within the limits of the 'LEEK IMPROVEMENT ACT, 1855.'

WHEREAS it appears that.....aged.....years, an inmate of the house occupied by you, is suffering from.....being a dangerous infectious disease, I am directed to call your special attention to the following extracts from the 'Public Health Act, 1875,' relating to infectious diseases.

As these diseases spread by communication from one person to another, and by the transmission of clothing and other things which have been exposed to infection, it is absolutely necessary for the protection of the Public Health that the Commissioners should adopt every possible means within their power to prevent their extension, and they trust to the good sense and prudence of the inhabitants to afford them all needful co-operation.

Care must be taken to prevent indiscriminate or unnecessary visits to the sick. Persons attending upon the sick, or persons whose clothing has been in the infected part of the house, must not, without previous disinfection, expose such clothing in any dwelling-house, factory, workshop, or any place occupied by others. No child residing in the house must be sent to school, or allowed to mix with other children, until the Medical Attendant certifies that infection has ceased.

EXTRACTS.
38 and 39 Vict., cap. 55.

SECTION 126.—'Any person who—

(1.) 'While suffering from any dangerous infectious disease, wilfully exposes himself, without proper precautions against spreading the said disorder, in any street, public place, shop, inn, or public conveyance; or

(2.) 'Being in charge of any person so suffering, so exposes such sufferer; or

(3.) 'Gives, lends, sells, transmits, or exposes, without previous disinfection, any bedding, clothing, rags, or other things which have been exposed to infection from any such disorder, shall be liable to a PENALTY not exceeding FIVE POUNDS.'

SECTION 128.—'If any person knowingly lets any house, room, or part of a house in which any person suffering from any dangerous infectious disorder has been, to any other person, without having such house, room, or part of a house, and all articles therein liable to retain infection, disinfected to the satisfaction of a qualified Medical Practitioner, as testified by certificate given by him, such person shall be liable to a PENALTY not exceeding TWENTY POUNDS.'

I am directed to state that the penalty to which any person becomes liable under the above sections will be strictly enforced.

Dated this.....day of.....188

.....
SANITARY INSPECTOR

I know of no instance in which any medical man has failed to report a case in due form, nor have I ever heard a single complaint from either a patient, or his or her family, in consequence of the medical attendant having done so. In cases where sufficient means of isolation exist at the patient's home, the occupier, as a rule, is glad to avail himself of any aid the Sanitary Authority can afford him. Where a patient could not be properly isolated at home, we have never experienced any serious difficulty in getting that person removed to the hospital. I have seen it urged in your columns that, were hospital accommodation for infectious diseases provided, parents would not allow their children to be removed from their homes to such hospital. Experience, in our case, reveals the fact that, when parents find that their children are properly cared for and kindly treated in such a hospital, they are only too glad to avail themselves of the protection thus afforded, both to the sick and healthy members of their families. The working of the system here has been attended by the most satisfactory results. The extent to

which the spread of infectious disease is thereby checked can be better imagined than stated.

As an illustration of the advantages arising to the public from the early information of the existence of infectious disease afforded by the system, I may mention that an outbreak of small-pox occurred here in July 1872, in one of the worst localities of the town. In two hours from the time the case was first seen by the medical attendant it was removed to the hospital, and everything in the house likely to retain infection at once submitted to the action of carbolic vapour, generated in the manner described by Messrs. Calvert and Co., the result being that the outbreak was stamped out with one case. In the month of February 1878, another outbreak of small-pox occurred in one of the best localities of the town. In this instance the disease had created several centres of infection before the medical profession became aware of its existence, and notwithstanding every effort thereafter made to arrest its progress, 23 cases cropped up, of which number 15 were treated at the hospital and recovered, and 8 treated at their own homes, two of which cases terminated fatally. Were it needed, experience suggests other facts, equally conclusive, that might be urged in favour of early information with regard to other dangerous infectious diseases.

If we are to regard the lessons inculcated by Dr. Farr and others of his school, we are bound to believe that the first principle of medical science is the prevention of disease, and the second, its cure. If this be so, then the bases upon which certain timid medical gentlemen found their objections or arguments against the notification of infectious disease must be very unsound.

Commissioners' Offices, Leek, Feb. 1882. R. FARROW, Sanitary Inspector.

STONEWARE TRAPS.

In reply to Dr. P. Hinckes Bird's letter on page 349, I beg to state that the makers of my disconnecting ventilating traps do not make either them or the plain siphon traps in the absurd style drawn on page 349. I believe some of the old-school manufacturers, however, still believe in the long rounded sweep denounced by Dr. Bird.

Glasgow, March 1, 1882. W. P. BUCHAN.

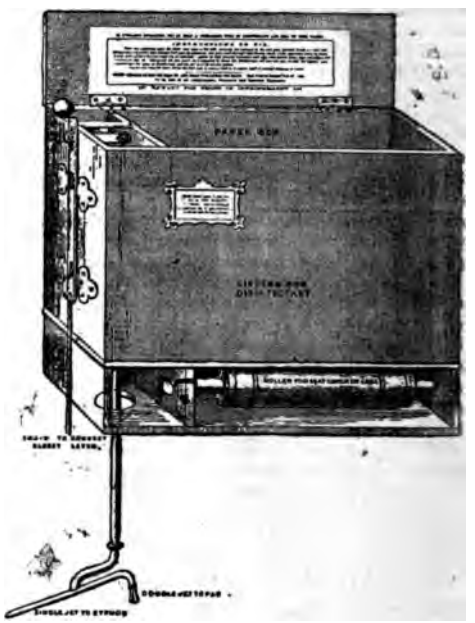
SANITARY INVENTIONS.

THE RADIATOR COMBUSTION CHAMBER.

ONE of the latest inventions in connection with smoke abatement introduced at the late Exhibition at South Kensington, was a little appliance entitled the 'Radiator Combustion Chamber and Draught Generator', introduced by the Radiator Range and Stove Company, Cannon Street, E.C.; whose other manufactures received full notice in our general report of the Exhibition. This invention, to which it is difficult to do full justice without the aid of drawings, is intended to be attached to existing grates to assist in consuming smoke. It consists of a hot-air chamber, having vertical bars, and in connection with this an opening is made at the bottom of the fire-basket to the back of the grate; into this the flame and smoke passing through the fire are drawn with the heated air from the chamber above named, the whole being collected in a combustion chamber at the back. All the gases are drawn through a white heat into this, before passing into the flue or chimney, and the fuel is thoroughly burnt with the gases, leaving nothing in the stove but fine dust; consequently all the heat is utilised for warming purposes. There is a regulating door, and a fall door, slightly perforated, which allow only sufficient oxygen to pass into the chamber for the process of combustion, and all cold draughts from doors or windows are said to be counteracted by their aid, and down draughts prevented by the powerful up-draught always maintained. The invention has appeared so recently that we have not had much opportunity of practically proving *its value, but the principle* appears to be good, and if it effects all that the company assert that it will do, it will prove a boon to those who do not feel disposed to invest in new grates, as it can be purchased at from 4s. 6d. to 7s. 6d., according to size.

RAIMES' NEW DEODORISER FOR CLOSETS, DRAINS, ETC.

THIS invention supplies a want felt in every household, how good so ever may be the sanitary arrangements as regards the closets and drains, and has the merit of being of the most simple, cheap, and efficacious character. It consists, as the drawing shows, of a narrow oblong box, intended to be fixed on the seat of the closet at either side most convenient. It is made either of common wood varnished, or of mahogany, French-polished, and is lined either with zinc or copper, according to the class of closet it is intended for, being, in reality, a small wood cistern lined with metal. The top part forms an independent paper box, the centre portion is the cistern, to which communication is obtained from the side, and the bottom, which it will be observed is open to the front, holds a small roller,



on which is wound a padded seat cover (disinfected) for use during winter or in case of illness, thus preventing danger to health or discomfort from sitting on cold or damp seats. The cistern holds about two gallons, and this is filled with water with a small quantity of disinfectant, Jeyes' Sanitary Compound or Morris Little's Phenyle having been found to be good. By means of a chain and crank carried from the cistern under the seat it may be connected with the water plug, and so rendered automatic in action with the water flush, or it may be used independently. From the bottom of the cistern a narrow tube is carried under the seat to the upper part of the pan, having two sprays, while a second, connected, however, with the first, descends to the receiver underneath. By pressing a small knob the valve is opened, the sprays of disinfecting liquid are carried around the pan, and a second lot is discharged into the receiver. The quantity required is but small, and it is calculated that the contents of the cistern will last a fortnight. Mr. Raimes, whose manufactory is at West End Lane, Kilburn, has placed the apparatus in the hands of several members of the medical profession, who have tested it in their own houses, and have pronounced it a complete success. Indeed, its advantages must be patent to the most casual observer. A small quantity of liquid disinfectant discharged around a closet pan, and on to the contents, is sufficient to neutralise

sagreeable or dangerous effluvium, but by sending a
n at the same time into the receiver, a further
tage is gained. It is in this receptacle that the foulest
collect, and, however good the drains may be, it is
sible to prevent their being present in a greater or
egree. The drains are also cleansed and rendered
ious, and short as the experience has been with this
riser, it has been proved that houses in which sewer
as constantly being evolved have, since the attach-
of this apparatus to the closets, been rendered
tly pure. It is also affirmed that, in closets where
aimes' deodoriser is in use, the germs of fever cannot
sseminated from the closet, should it be used by
d persons, as the rapid discharge of the disinfectant
he evacuated matter at once destroys any danger.

IMPROVED PATENT PAPER FELT.

ts. DAVIDSON and SONS, Limited, the extensive
manufacturers of 80, Upper Thames Street and
nd, have patented a new kind of paper felt to which
ttention has been drawn, for the purpose above
, and for other uses. To those who study health,
rt, and economy, the new paper felt strongly recom-
itself, as, unfortunately, the flooring boards in the
ty of houses soon begin to 'gape' or open as the
becomes dry, causing a great quantity of dust, dirt,
raught to rise. Not only is the dust and dirt
us to the carpet, but the draughts are both un-
rtable and in many instances injurious to health.
ld system of pasting paper over the crevices is at
ut a sorry expedient, and the laying of sheets of
ry brown paper is not much better, because it is not
nough in substance. The felt in question, although
paper, is mainly composed of a woolly substance,
nearly a sixteenth of an inch in thickness. It is
e and cleanly, effectually prevents dust or draughts
enetrating through it, and gives to ordinary Brussels
almost the feel of a velvet pile to the tread,
it materially increases its lasting qualities (it is
d by the makers to the extent of one-half). It also
) the warmth and dryness of the rooms in damp or
eather. Its weight causes it to lay perfectly flat,
ng no fastening down, and it can be readily taken
h the carpet and relaid. In the case of infectious
s, and where carpets, as in the case of the present
, are only laid in the centre of the room, the paper
y be saturated with a disinfectant, a large quantity
ch it will hold in solution, and give off the vapour
without injury to the carpet, and, finally, its cost is
ing, that it can never be a bar to its use. There are
purposes to which this paper felt is applicable,
y, in certain situations in the construction of houses,
this we shall advert in the articles on this subject
ll appear in THE SANITARY RECORD during the
of the year.

PUBLIC LAVATORIES.

. the defects in our social system, the absence
ic lavatories and their attendant conveniences in
1 and our large towns, is one that cries loudly for
The want is one that has been written about,
upon, and admitted, by all classes for many years
nd our deficiencies as compared with many of the
ntal cities has been urged again and again; notably
rticle on 'Sanitary Conveniences for Women', by
Hoggan, M.D., published in the SANITARY RECORD
:. 15, 1880. Even private enterprise, which often
1 hand what public bodies fail to initiate, has until
shrunk from introducing a system that it was feared
ıot, for various reasons, prove a financial success.
cclude the few railway stations where such accom-
n is to be found, there is not, we believe, in the
of this vast metropolis, a single place where
nces, for the use of women in particular, can be
Fortunately, a Company has been recently formed
to take this all-important matter in hand, and must assuredly win the hearty good wishes of all classes for the success of its enterprise.

The 'Châlet' Company, Limited, the name under which this association has been registered, and whose chief offices are at 17, Buckingham Street, Strand, proposes to erect pretty and tasteful buildings of wood, iron, or brick, in the form of a Swiss châlet, in any public thoroughfares, when arrangements can be made with vestries or other local authorities. The size will vary according to circumstances, but are estimated to be as follows:—Length, 20 ft.; breadth, 12 ft.; and height, 10 ft. The interior will be divided into two distinct compartments, one for ladies, the other for gentlemen, the entrances being at either end of the châlet; that to the ladies being entered through a vestibule fitted up as a cloak room, and where parcels may be left at a small charge. The lavatory and retiring rooms open out from the cloak room, and will be under the charge of an experienced female attendant. The arrangements on the men's side are similar, but increased lavatory and closet accommodation is afforded in place of the cloak room.

The general conditions under which the Company propose to erect the châlets appear to have been framed in the most liberal spirit. They offer to pay a rental of £10 per annum for each, besides rates and taxes, to the local authorities, the buildings to be constructed upon plans approved by the surveyor of the district. The Local Authority is to retain all right, title, and privilege over the site utilised, and the Company agree to guarantee proper management in accordance with municipal and hygienic regulations, and failing such observance, the authorities have the right to order the removal of them. Such, in a condensed form, are the proposals of the Châlet Company to supply this great public want. When it is remembered that nearly 218,000,000 of persons are annually carried by the Metropolitan and District Railways, tramcars, and omnibuses alone, it may be easily imagined to how many thousands of both sexes the proposed erections would prove a healthful convenience.

Already Leeds, Birmingham, York, Northampton, and many other large provincial centres, have made contracts with the Company; the Metropolis, which should have been the pioneer in the movement, is beginning to realise the advantages offered by it, so that we hope soon to see these needed conveniences in our great thoroughfares and parks, etc.

ILLUSTRATED SANITARY PATENTS.

3,040. (1881.) IMPROVEMENTS IN APPARATUS FOR PURIFYING WATER: J. H. PORTER, C.E., LONDON. [6d.]—This invention has for its object the regulation automatically of the supply of the solution of lime or other reagent employed in carrying out the softening or purification of water, so as to preserve the due proportion under varying rates of discharge from the vessel in which the solution

FIG. 1.

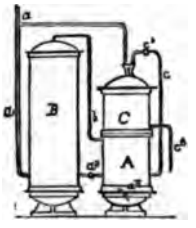
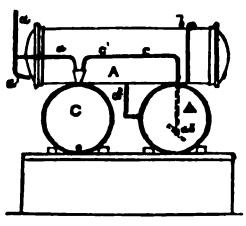


FIG. 2.



is stored. The operation of the apparatus is as follows:—Fig. 2 is simply another form of the apparatus. The vessel A being filled with the solution of lime or other reagent to be employed in the softening or purification of the water, and the vessel B containing a quantity of air somewhat exceeding in bulk the quantity of the reagent

which is to be expelled from the vessel A into the vessel C, the cock on the pipe a^2 being closed, and the inlets on the pipes a and a^1 and the outlets from the vessels B and A being open, when the outlet from the vessel C is opened, the pressure of the water flowing from the main supply or tank by the pipe a^1 into the vessel B will cause air from the vessel B to pass by the pipe b into the vessel A, the air by its pressure expelling a quantity of the solution by the pipe c into the vessel C, to meet and mix with the water entering the vessel by the pipe a to soften or purify the said water, the water so softened or purified being discharged from the vessel C by the discharge pipe c^2. It will thus be seen that as the pressure to expel the solution is obtained from the main supply or tank from which is obtained the untreated water, that as this pressure varies, the quantity of the solution forced from the vessel A into the vessel C will correspondingly vary, and thus always be in due proportion to the quantity of the water to be treated entering the vessel C. By means of the cock c^1 upon the pipe c, the proportion of solution to water entering the vessel C may be regulated. When the supply of solution which was in the vessel A is exhausted, and it is desired to refill the vessel A with solution, the cock on the outlet from the vessel A is closed, and the cock or pipe a^2 is opened, and the water from the vessel B passes by the said pipe a^2 into the vessel A, the air returning from the vessel A into the vessel B. The cock on the pipe a^2 is then closed, and the water so passed into the vessel A is now intermixed with the lime or other re-agent, and after agitation for a period determined by experience and the capacity of the vessel, the solution may be left to clear for use, forming the solution to be employed for treating a further quantity of water. The solution of lime or other re-agent employed may be prepared in any desired or convenient way. When the solution in the vessel A is exhausted, and a fresh quantity of water admitted to the vessel A from the vessel B, the precipitated lime may be agitated with the said water, as before described, to make a solution of lime or other re-agent. The apparatus employed to effect this agitation of the lime may be of any suitable kind. In the drawings a shaft a^3 is shown, which extends into or across the vessel A, and is provided with rousing or agitating arms or prongs, the end projecting outside the vessel being provided with a handle or hand-wheel for turning the said shaft.

3,170. (1881.) APPARATUS FOR COOLING, CLEANSING, AND PURIFYING AIR: R. R. GIBBS, LIVERPOOL. [6d.] The object of this invention is to provide an apparatus to cool, cleanse, and purify air as it is admitted into buildings of any description. With this object he constructs a frame of wood or other suitable material of any convenient size and shape. In this frame he places strips of glass, wood, metal, or other suitable substance, in such a manner that they form a series of V or U-shaped horizontal troughs, which extend from side to side of the frame, and are made watertight. These troughs are arranged at such a distance apart that the upper edges of the lower trough are at or above the level of the bottom of the trough next above it. A narrow horizontal aperture is formed in one or both sides of each trough, a little below the level of the bottom of the trough next above, which aperture may extend from side to side of the frame. This frame, so fitted, is placed in the window or other aperture for the admission of air to the room or building, and water from the main or cistern is allowed to run slowly into the uppermost trough, which it fills up to the level of the narrow horizontal aperture, through which it then falls into the trough next below, and so on until it reaches the lowest trough, whence it is conveyed to the sewer. The air, therefore, entering the building has to pass through the falling water, and over the water contained in the troughs, upon the surface of which water it is deflected by the outer sides of the troughs. By this process it is cooled, cleansed, and purified. With the object also of being enabled to close this apparatus when it is not desired to allow air to enter the building, he fits one or both sides of the troughs upon a movable frame, or on pivots; or he connects the two or more strips that form the trough by some flexible material, so that the strips can be partly or wholly shut after the manner of a Venetian blind, and thereby regul

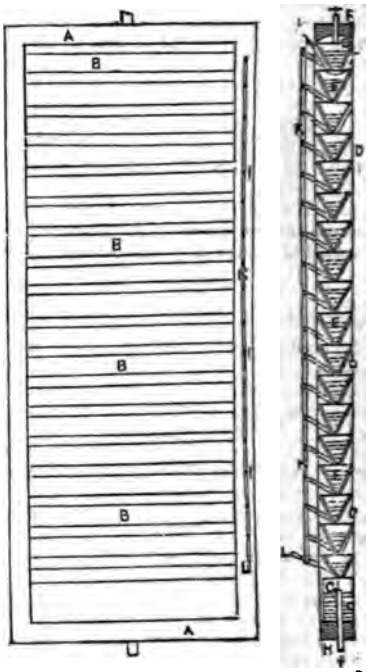


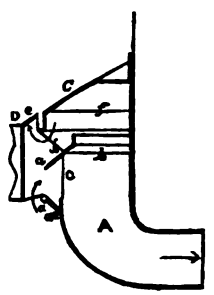
FIG. 1.

FIG. 2.

the admission of air. He can also use any liquid d infectant or scent with the water.

AMERICAN PATENTS.

248,207. VENTILATOR: JOSEPH PATCHETT, L RENCE, MASS. Filed April 22, 1881. (Model.) Is Oct. 11, 1881.—*Claim* 1. In a ventilator, the outlet flu in combination with the inlet flue A, the inlet flue b covered at the top and formed with the side openi substantially as and for the purposes specified. 2. In a tilator the outlet flue B, in combination with the inlet flu the top or outer opening of the inlet flue being on a le level than the side opening of the inlet flue, substantia and for the purposes specified. 3. The outlet flue B, the covered inlet flue B, in combination with the rim D the cover C, substantially as and for the purposes spec 4. The outer flue B, and the covered inlet flue A, fo with the side opening C, and provided with the deflec



and the perforated flange A^1, in combination with the D, substantially as and for the purposes specified. 5. outlet flue B, and the inlet flue A formed with the op c, in combination with the flue A, formed by the cap and the rim D, substantially as and for the purposes fied. 6. The herein-described ventilator, consisting inlet flue A, cap A, opening c, flanges a^1, perforation

rim D, plates *e*, cover C, passage *h*, and outlet flue B, substantially as and for the purposes specified.

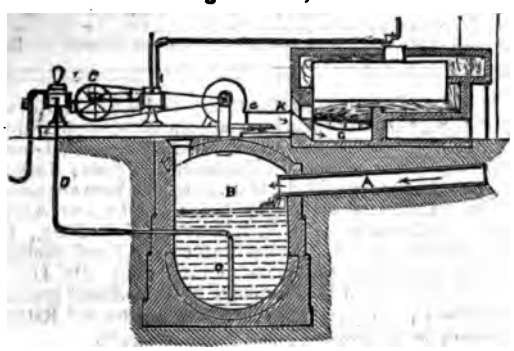
248,195. PORCELAIN WATER-CLOSET BOWL: GEORGE R. MOORE, PHILADELPHIA, PA.—Filed March 22, 1879. Issued Oct. 11, 1881.—*Claim.* A porcelain water or air

closet bowl, with its lower part of oval or oblong shape, and nearly vertical walls, and having its outlet aperture bounded by a straight line across, or nearly across, the bottom portion of the whole bowl, by which the said outlet aperture is substantially one portion of the bottom of the oval bowl, bisected at its shortest line, substantially as and for the purposes herein set forth.

247,865. FILTER: JULIUS WADISKA, NEW YORK, N.Y.—Filed July 26, 1881. (No model.) Issued Oct. 4, 1881.—*Claim.* In a filter, the combination of the sectional

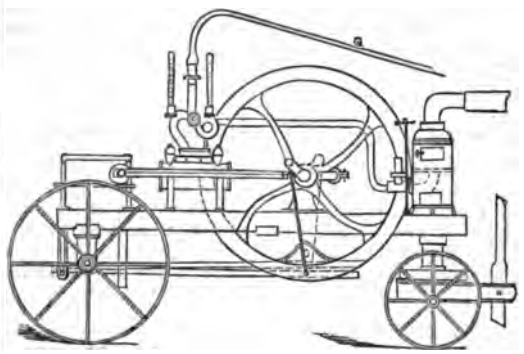
shell A B, having supply-pipe *a* and discharge pipe *b*, with the inner filtering sieve or sieves placed into the part B, and with the inner solid spreading plate C, held under the pipe *a*, convex side upward on legs *g*, and wing *h*, and clamped by the part A, substantially as herein shown and described.

248,216. REMOVING HOUSE SEWAGE AND VENTILATING THE PIPES THEREFOR: HENRY REESE, BALTIMORE, MD. Filed Feb. 21, 1881. (No Model.) Issued Oct. 11, 1881.—*Claim* 1. The combination, with a conduit arranged to convey sewage from a house or houses, of an air-tight reservoir, into which said conduit discharges, and into which it deposits the sewage. An air-exhausting apparatus, arranged to exhaust the air and gases from the reservoir and the sewage conduit, and force them into a



furnace, the said furnace and a suitable pump to remove the sewage from the reservoir, as set forth. 2. The combination with the conduit A, reservoir B, and furnace G, of the blower D and the pipes J K L, provided with dampers *aa*, all arranged to operate substantially as set forth.

248,160. APPARATUS FOR THE ODOURLESS EMPTYING OF SINKS, SEWERS, ETC.: URBAN GÖTZENBRUGGER, VIENNA, AUSTRIA. Filed May 26, 1881. (No Model.) Patented in Austria, Oct. 20, 1880. Issued Oct. 11, 1881.



—*Brief.* The oven for burning the foul gases is furnished with an inlet pipe and an outlet pipe, the latter movably mounted on the top. Two cranks are provided with pedals for operation of the pump. The transport vessel is provided with inside supporting hoops to resist the pressure of the air when a vacuum is produced in said vessel. *Claim.* In apparatus for the inodourous emptying of sinks or cesspools, the combination, with an oven for burning the foul gases, said oven provided with an inlet and outlet pipe, the latter movably mounted on top of said oven, of a double-acting air-pump provided with a reversing cock, of a three-crank shaft, two of these cranks connected to treadles, and the third to the piston-rod, and of a fly-wheel provided with a balance-weight, all of these parts mounted upon a frame resting on wheels.

NOTICES OF MEETINGS.

NATIONAL HEALTH SOCIETY.

DRESS OF THE PERIOD.—In consequence of the disappointment many ticket holders experienced in not obtaining admission to the lecture on the 25th February, Mr. Treves has kindly consented to re-deliver it on Saturday, March 18th, at 4 o'clock, at the Town Hall, High Street, Kensington. Those who had tickets, and failed to obtain entrance on the 25th, are requested to communicate with the Secretary of the National Health Society, 44, Berners Street, W., when numbered seats will be forwarded.

SANITARY INSTITUTE OF GREAT BRITAIN.

At a meeting held February 23rd, 1882, Professor F. S. B. F. De Chaumont, M.D., F.R.S., in the chair, the secretary read a list of donations to the library. Benjamin A. Whitelegge, and Dr. Peter Burgess, M.A., were elected Fellows of the Institute; also one Associate was elected.

At the ordinary meeting of the institute, held March 8th, Dr. A. Carpenter in the chair, a prize of £200 for an essay on 'The Range of Hereditary Tendencies in Health and Disease' was presented by the Rev. E. Wyatt Edgell, B.A., to Mr. G. Gaskoin, M.R.C.S., who afterwards read a paper on the subject.

PREVENTION OF CRUELTY TO ANIMALS.

Prizes of £10 and £5 have been offered by a member of the York branch of the Society for the Prevention of Cruelty to Animals for the first and second best Essays on the following subject, and under the conditions below stated. Subject.—Cruelty to Animals, as most Frequently Practised in Everyday Life. Conditions.—1. No Essay to be of greater length than fifteen pages of about 500 words each. 2. Essays to be sent before the 15th April 1882, to Mr. John Edmund Jones, Honorary Secretary to the York Branch, R.S.P.C.A., 21, Coney Street, York, unsigned, together with a sealed envelope containing name and

address; the Essay and sealed envelope to bear a motto or distinguishing mark. 3. The Essays will be submitted to judges appointed by the Society, and the sealed envelopes will not be opened until the Essays are judged. 4. Prizes will not be awarded unless the Essays are considered of sufficient merit, and the latter will become the property of the Society, for publication or otherwise.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, March 17th, at 7.30 p.m. The minutes of the last meeting will be read. Dr. Percival, Medical Officer of Health to the Northampton Combined Sanitary District, nominated by Mr. Shirley Murphy and Dr. Vinen, will be ballotted for as an extra-metropolitan member. Members are invited to introduce subjects for discussion, to which the evening will be devoted. The President will make some remarks on 'The Necessity for an Alteration of the Law as regards Re-vaccination', and will give some statistics. Mr. Shirley Murphy will call attention to the 'Unsatisfactory Condition of Legislation concerning Metropolitan Bakehouses'.

EXHIBITION AT PETERBOROUGH.

An exhibition of 'Industrial Art and Manufactures,' under the presidency of the Right Hon. Earl Spencer, K.G., is to be held in Peterborough, from the 17th to the 29th April next. The exhibition will include labour-saving and sanitary appliances, and articles of domestic use and economy.

MANCHESTER BUILDING EXHIBITION.

A Building Exhibition similar to the one lately held at the Agricultural Hall, but more extended in scope, will take place at the Bingley Hall, Manchester, from April 17th to May 6th, inclusive.

EXHIBITION OF LIFE-SAVING APPARATUS.

An Exhibition of Means and Appliances for the Protection and Preservation of Human Life, to be held at the Alexandra Palace, Muswell Hill, is being organised. Mr. Lawrence Saunders, C.E., is the hon. secretary.

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will be subjected, if unnecessarily long, to a strict curtailment, however.

1. Air Analysis.

Is there any kind of air analysis which would be so practically useful, as to diagnose exactly whether a smell complained of in a large room—the parquetted floor of which is expensive to disturb—is due to the escape of illuminating gas, foul air from the sewer, or decaying animal matter? A. C. A.

[Certainly; Mr. Eassie gives nearly such a case in point, and where an analysis of the air resulted in showing that the smell complained of—which came on suddenly—was due neither to gas escape nor sewer-air, but to one of our house rodents dying under the floor. The result of the application of the moist combustion process to the air in question was that 100 cubic feet of the air contained 0.6 grains of organic matter only, which goes to prove that neither gas nor sewage had to do with the smell. Air analysis is only practised by a few experts, but it is a valuable assistance to the sanitary student. A comprehensive handbook upon this subject will shortly be given to the public by a most competent authority, which we shall duly review.]

2. Burial Space.

What is the rule as to the allotment of space per 1,000 head of population in a cemetery about to be established? I want a fair basis for calculation. In Petto.

[The common practice is to give about a quarter of an acre of burial-space to each thousand head of population. But this is not sufficient where the soil is unfavourable, and especially where any extensive pathways amid the graves are prospected. The best rule is to transcend this rule by fifty per cent. If the district can afford it, half an acre per 1,000 of population would be most ample, and permit of a good embellishment of the ground in groves and shrubberies. For the dry law statistics of this matter consult *Laws relating to Burials*, by T. Baker, 4th ed., Maxwell and Son, London, and for the æsthetic side see *God's Acre made Beautiful*, written and published by W. Robinson, F.L.S., at the office of the *Garden*, Southampton Street, Strand, W.C.]

3. Lavatory-wastes.

What is the cause, can you tell me and greatly oblige, of a most offensive smell from the basin of a lavatory, which I am certain delivers in the open air, in disconnected fashion; it is now unbearable? Enquirer.

[It is not sufficient to cause the waste of a lavatory to deliver in the open air over a gulley, or even some distance in the open away from a gulley, neither is it sufficient to put a trap under the basin. The smell complained of is due to the ultimate coating of the inside of the pipe with the slime derived from decomposed soaps, than which nothing can be more offensive. These waste-pipes should be open both at top and bottom, so as to have a clear blow of air through them, and be regularly cleaned out. There should be, of course, a trap under the basin, but it should be one which permits of cleaning out also, a Beard and Dent's trap for instance.]

4. Coke-Gas Fires.

In your issue of the 15th December 1880, on page 236, you describe a coke gas grate, the invention of Mr. Cosmo Innes. I have fitted up a grate on this plan in a well-ventilated room, and am greatly pleased with it in every respect. I think of altering the grate in my children's night nursery (where a fire is generally burning in cold, damp weather) on the same plan. Is there any objection thereto on the score of health or safety, assuming that the draught up the chimney is good? Medical Officer of Health.

[My reply to 'Medical Officer of Health' would be that there is not the smallest danger. We have burned coke-gas fires in three rooms in this house for a year and a half now, and nobody has ever detected any carbonic acid coming into the rooms from them. All of my friends who have fitted the coke-gas grate in their houses report the same thing. There is no reason why carbonic acid should come into a room from a coke fire more than from one of coal. Every man who burns a coal-fire burns coke involuntarily for three-fourths of the time. When he puts on a shovel-full of coal the first action of the fire is to coke it, during which process the gas is given off, and is burned, more or less imperfectly, before it passes up the chimney. When that process is completed, the fire assumes an uniform red and glowing appearance, gives off a great heat, and is a pure coke fire.—Cosmo Innes.]

5. Water Analysis.

Apropos of the very interesting and important paragraph at page 155 of last issue of the Sanitary Record on the Local Government Board investigations into the significance of water analysis and its specific poisoning, would you favour me with the title and publishers of work from which your information is culled, or from what source such as is known on the subject can be acquired. Failing this, would you favour us with more exact and definite information in a future article in the Sanitary Record. It is to be hoped, if the work issues from the Local Government Board, analytical results will (not as *usual*, and *solely* as occurs in blue books) be expressed, not in Frankland's mode and terms only, but also in those of Wanklyn. A Medical Officer of Health.

[The paragraph in question is founded on the report of the Medical Officer of the Local Government Board for the year 1880. This report was published as a Parliamentary paper (No. C. 3,048) in the early part of the present year, but there is nothing more in it on the subject than a brief reference by the Medical Officer to the interim results of Dr. Cory's researches, which are as yet incomplete.—Ed.]

Medical Officers of Health.—William C. Matthews, M.R.C.S., L.R.C.P., has been appointed Medical Officer of Health for the Gorton Urban Sanitary District, Lancashire, at £40 per annum, *vice* Hammond, resigned; Stewart Carson, the younger, M.B., Mast. Surg., has been appointed Medical Officer of Health for No. 1 district, and Alfred Joseph Pickworth, I.R.C.P. Edin., L.F.P.S. Glasg., for No. 2 district of the Alston-with-Garrigill Rural Sanitary District, at £20 per annum each for one year. Mr. Henry Uosdell, surgeon, of Buckfastleigh, has been elected medical officer and public vaccinator for the Staverton and Rattery Districts, in the place of Mr. Phillips, resigned.

Surveyors and Inspectors of Nuisances.—Mr. John William Cockrill has been appointed Surveyor to the Corporation and Urban Sanitary Authority of Great Yarmouth, at £350 per annum, *vice* Baker deceased; Mr. W. H. Maclise has been appointed Surveyor and Inspector of Nuisances to the Nuneaton Local Board and Urban Sanitary Authority, at £150 per annum; Mr. E. Toogood has been reappointed Inspector of Nuisances for the Bridgwater Rural Sanitary District, at £120 for one year.

ORIGINAL PAPERS.

THE SEWERAGE OF PARIS.

By W. EASSIE, C.E.

NG lately been entrusted with the re-arrange- of the drainage arrangements of a large ion in the Champs Elysées, where I had ion to remove the old fosse or cesspool, and luce the filter tank or separator at the foot of soil-pipe, I necessarily came across much that nteresting; and having just perused a paper the subject of the Paris sewerage, which very explains the whole matter in its present and cted state, I will now offer a short analysis of ime.

ıay premise by saying that in the older system, ɔartly in use, the excreta is detained in large ools—under the houses as a rule—until emptied; hat in the improved system the solids are caught upright canister-shaped metal holder, which is nstructed as to allow the liquids to escape there- into the sewer, or what is used as a sewer for resent. It is not possible, under existing cir- tances, to disconnect a house from the drain or ool with any degree of satisfaction, and it is fore not attempted.

. E. Vallin, Professor of Hygiene, Val-de-Grâce ge, and Secretary to the Consulting Committee uestions of Public Health, has lately published ıer on the new sewage scheme recommended by ommittee of Inquiry appointed by the Minister riculture, etc., in September 1880, in opposition e older plan advocated by the City of Paris neers, with M. Alphonse at their head.

e Commission of Inquiry consisted of twelve bers, and the result of their labours has just published by the Imprimerie Nationale. The ne also contains some special reports upon sew- ınd other nuisances, and on malaria caused by g the sewage into the Seine. Dr. Vallin says this most important problem of providing Paris a proper system of sewerage has been pending nany years, but that on one point everyone is ɛd, at least in principle, viz., that permanent ɔools, as forming a structural portion of dwelling- es, should be superseded. The only question is what?

ris possesses a colossal system of underground rs, the construction of which was commenced as ack as 1852, under the direction of M. Belgrand.

network, now measuring some 600 miles in ıt, is ultimately to be further enlarged by the tion of another 150 miles of sewers on each side ıe river. In the first place, an immense trunk r, commencing at the higher levels above, and eeding downwards, in a perpendicular direction, rds the Seine; and secondly, two large inter- ing sewers—each several miles long—besides ıtless tributary ramifications, with their host of ler affluent drains.

ıe sewers are all built up of solid masonry, with ıg cement coating, and are perfectly water-tight. e of the larger trunk sewers are regular tunnels mensions, five to six yards in height, by four feet ridth. The system of flushing and scouring is irable; and the ventilation so unexceptionable parties of visitors can travel along the stream, out the slightest inconvenience, in the neat little olas provided for the purpose. They are lighted up with gas lamps, and have an embankment or ledge, on each side of which rest the water and gas supply mains; pneumatic transmission tubes; tele- graph cables and telephone wires; and all the machinery for the regulation of public clocks.

But the Paris sewers, as such, differ from those of the London Main Drainage System, in that they were not originally designed to carry off anything beyond the surface water of the city; although, from their ample dimensions and perfect construction, they have gradually been brought into requisition, in part at least, for the same uses as the London sewers. The new buildings in Paris, during the last decade, have in every case been fitted with filtering tanks to every water-closet, and here, of course, the human ejecta would, to a very great extent, resolve them- selves into liquids and be thrown into the sewers. In fact it is estimated that, during the said period, half of the sewage, both solid and liquid, in Paris, has thus found its way through the sewers to the works at Gennevilliers.

Believing that the old cesspool system would endure for a long time to come, the Government Commission of Inquiry recommended, through Pro- fessor Brouardel, a provisional system of sewerage, and this consisted of reservoirs, containing about as much as a contractor's sewage cart; and with the exception, in point of fact, of small matters of detail, this process is a reproduction of Liernur's pneumatic process.

From the preceding account it will be seen how widely the system recommended by the Commission differs from that to which the City Engineers firmly adhere, namely, the delivery of the sewage directly into the sewers themselves. M. Durand-Claye, a chemical expert attached to the Commission, has drawn up a Report on the City Engineer's objections to the new scheme; and in it, too, he has done his best to bring into relief the practical difficulties attaching to the Commisioners' recommendations.

According to M. Durand-Claye the execution of the temporary arrangements would necessitate an outlay of £160 per soil-pipe, and as he estimates the entire number of such pipes to be 230,000, the total expenditure would amount to an enormous sum. If the recommendations as to iron cesspools were carried out, the operation of emptying cesspools, carried on in the public streets, will need to be con- tinued; only, instead of taking place, as at present, once a year, the Parisians would have to bear the infliction weekly or monthly. It will, moreover, never be anything but a partial clearance; for the fosse, being emptied by suction, will still present, on walls and floor, a large quantity of offensive matter. The men must go down below, to cleanse the walls and gratings. All this work entails direct communi- cation with the outer air.

The definitive part of the plan recommended by the Commission is also very closely criticised by the City of Paris Engineers. The metal drain extending from the lower end of the soil-pipe as far as the precincts of the sewage works, will require tubes measuring some 600 miles in length, in fact equalling the whole course of the sewers themselves.

M. Durand-Claye estimates the cost of the work and its accessaries, inclusive of the outlay required for that part of the sewers which awaits completion, at about £6,000,000. We have seen how much piping has already been stowed in the sewers, and the question would arise, are they equal to the accommodation of the extra piping?

It is also urged that, what with the difference of

levels in the drainage area, insufficient gradients here and there, and the many miles of the proposed metal sewers, that many pumping stations would be needed in the midst of the most populous quarters. This proposed system, it is said, would also involve the retention in suburban Paris of those chemical works, the insalubrious and offensive character of which would seem to baffle the resources of sanitary engineering, and which, therefore, it is desired to abolish with the least possible delay.

It would be well now to examine the reasons urged by the Commission against the older scheme of the City Engineers, and inquire upon what grounds the Commission were led to set it entirely aside. The leading features of the Municipality of Paris scheme may be stated as follows:—These would be the immediate and direct delivery of the sewage, by means of a hydraulic syphon, from the house, straightway into the sewer, and thence to the pumping stations, with plenty of flushing water as a vehicle; the final closing of extra-mural sewage utilisation works; the complete abolition of permanent cesspools, of ventilator shafts, and of cesspool emptying; the use of filtering tanks or separators at the foot of soil-pipes, as a temporary expedient, in cases where the sewers have no adequate gradient or diameter; the raising of the quantity of water-supply per day, and per inhabitant, from 34 gallons —the present rate of supply—to 55 gallons; and the cast and spread out of the sewerage over the lands situate on what is called the Peninsula of Gennevilliers, and the most outlying parts of the Forest of Saint Germain.

The Commission have passed severe strictures on the above Municipal scheme, and they urge that it is impossible to make water-tight sewers, which will prevent saturation of the subsoil; that the present network of Paris sewers possesses neither fall nor section equal to the requirements of the case; that the sewers diffuse malarious effluvia; that the additional introduction of fæcal matter will favour the spread of contagious maladies, and that the seeds of diseases contained in the sewers will not be destroyed by the process of irrigation or farming operations. It is admitted by the City Engineers, that dilapidated sewers will leak, but they contend that they can construct perfectly water-tight sewers, and M. Durand-Claye himself informs us, that at Gennevilliers, for many years past, he has had in daily use concrete sewers from three to five feet in diameter, exposed to a great pressure at the least, and through which the Asnieres sewer, starting from the pumping station in that place, bears the sewage to the irrigation farm. The liquid reaches Gennevilliers just exactly as provided for and required in point of quantity, and there has never been any leakage worth mentioning, notwithstanding the very frequent ramming shocks the sewer has to sustain. If, under the circumstances, sewers are found to remain impervious, how much more assuredly, says M. Durand, will they keep so when the pressure will be totally absent, as in the well ventilated sewers of a town.

If the Paris sewers did actually leak, as alleged, running as they do in many streets right under the foot pavement, and lying over the cellars, with a difference of level equal to one mètre, and more, complaints would be frequent. But householders have never noticed any drainage into their premises, and again, when the roadways are taken up, there are found no puddles and collections in the trenches close to the sewers; or but very rarely indeed. It is admitted by M. Alphonse, as to about seventy miles of sewer which have so slight a fall, that they cannot be properly scoured. Here the waters stagnate, silt is deposited, and stoppages occur, giving rise to foul exhalations. This, according to Dr. Vallin, is the most telling argument that can be urged against the City Engineers. Fresh sewage cannot pass through and reach the terminal within the twenty-four hours. The City Engineers are confident that they will be able to cope with this difficulty by the employment of a larger number of men, with the help of additional capital, and particularly by means of the system of relief pipes, provided for in their scheme. In Paris, the arterial main sewers have an average fall of from thirty to forty centimètres per kilomètre, which exceeds the gradients of the London system. It is to the smaller branch sewers that the objection chiefly applies, and, considering that only seventy out of a total network of 750 miles are confessedly deficient in fall, the City Engineers may, perhaps, be trusted to devise some efficient plan to remedy the evil.

Whether sewers shall be allowed to have direct communication with the air above ground, or be trapped and hermetically sealed, is a problem of urban sanitation, which has been a subject of endless debate. Dr. Vallin is in favour of thorough ventilation of the sewers, and in this opinion he differs from the views generally endorsed by the Government Commission. It might be supposed that communication between the sewers and the atmosphere, has the effect merely of diluting the sewer gases, by the action upon them of the air of the streets, and that it is only at the expense of the streets that the air of the sewers is rendered innocuous. But such is not the fact, and a series of analytical trials instituted by M. Wurtz, himself a member of the Commission, reveals in this respect evidence of the very highest importance.

When the motion of the waters renews the surfaces, bringing them incessantly in contact with oxygen, when there is a free current of air in the sewers, the sulphuretted hydrogen becomes readily oxidised and inodorous non-volatile sulphates of ammonia are formed. Moisture renders this reaction still more energetic, since the air of sewers is loaded with the vapour of water, the steam is condensed against the brickwork and the walls of the water mains, as well as of all the other pipes and cylinders that are crowded inside the Paris sewers. These large humid surfaces hold in a state of solution such portions of the highly soluble gases as may not have undergone a chemical change, and thereby prevent their expansion into the outer air. On the other hand, however, when the ingress of air into the sewer was stopped, when the water, on becoming stagnant, discontinued the process of multiplying its surfaces of contact with the oxygen, not only did the sulphuretted hydrogen cease taking up oxygen to transform itself into sulphates, but the sulphates themselves, which had previously been formed, would be resolved by the organic matter in course of decomposition. This organic matter depriving the sulphates of their oxygen would reduce them to sulphites or sulphuretted hydrogen, and then would follow a black settlement, an evolution of bubbles, and layers of slimy froth.

This surely is a striking proof, going to show that thorough ventilation is not merely a means of sweetening the air by the dispersion of miasmatic admixtures, but that in addition thereto, it will destroy them chemically, or, in other words, burn them. Ventilation is the most active, the most thorough disinfectant. For, as attested by the above experiments, it

operates quite as efficiently upon the air as upon the mud and slime of the sewers. M. Wurtz noticed that the offensive odour of sulphuretted hydrogen was very quickly dispelled, merely by removing the lid of the manhole at a spot he happened to be inspecting.

Dr. Vallin lays it down that thorough ventilation is the only safe method, and consequently he demurs to Professor Brouardel's proposition to the following effect:—'Thus we observe that a constant interchange takes place between the air of the streets and the atmosphere within the sewers, whereby the latter improves at the expense of the former.' This dictum might possibly find its application in the matter of those morbific agents, other than the above named sewer gases, which sewage is supposed to hold. To this extent Dr. Vallin considers Professor Brouardel's conclusion as a question worthy of discussion.

As to the propagation of contagious diseases as a consequence of sewage passing through the sewers, this point constitutes for sanitarians and physicians the true Gordian knot of the question. The Commission object to the direct delivery of sewage into the sewers, on the score of the noxious smells which it would produce.

Here it may be mentioned, that in a paper published in 1879, the Director of the works himself objected to the plan of delivering the sewage into the sewer, and he then contemplated, as part of the scheme, the retention of the filter tanks previously mentioned. The City Engineers, however, have by this time made up their minds that the only acceptable plan will be the system of direct delivery into the sewer; consequently it may here be assumed that these filter-tanks or separators would entirely disappear, and this will simplify everything. It is urged, that direct sewage delivery will have the effect of tainting the air of the streets to a much larger extent than at present. Professor Brouardel fears that the offensive character of the sewer flood will be so greatly intensified, that in the drains of smaller calibre, there will be nothing left but accumulations of decaying organic matter.

M. Durand-Claye, on the other hand, tells us that as it is, and for a long while past, three parts of the nitrogenous matter ejected by the population has been finding its way direct into the sewers. In support of this assertion, he cites the public urinals, the 'pails' of workmen's habitations, the separator tanks of the better class of dwelling-houses, as also the direct sewage delivery into the Salpêtrière, the Monnaie, the Invalides, and the Ecole Militaire main sewers. It will be remembered that Paris will soon have an increased supply of water per day—500,000 instead of, as at present, 350,000 cubic mètres.

In Dr. Vallin's opinion, the public works now in progress should be completed, before laying down at an enormous expense a continuous line of hermetically sealed metallic piping, specially designed to carry off the solids. He suggests that both solid and liquid sewage should, as a *provisional* arrangement, be allowed to run straight into the sewer itsef. He believes that the sanitary condition of Paris would not thereby get worse than it has been hitherto, at any rate. Direct sewage delivery may not be the most perfect system, but it is neither so bad, nor so dangerous, as the Commission would seem to deem it; and if, after a certain number of years, the dangers and objections now predicted should actually make themselves felt, then it will be time enough, according to Dr. Vallin, to lay down the special metal duct as recommended by the Commission. In this way there would be no loss or waste of present resources, no commitments as to the future; and one might, without danger, wait for some definite proof, to show that fresh efforts and further outlay are a matter of actual necessity.

From the above relation, the present state of the question as regards the final system of sewering Paris may be gathered, and it will be seen that eventually, proper sewers must be before long laid down, so as to remove the sewage to a sufficiently distant outfall.

Since the issue of the Commissioners' Report a new discovery has been made, which is likely to revolutionise the manufacture of ammoniacal salts. M. Schloesing, a member of the Commission, has read a paper before the Institute, in which he describes a new process for extracting the nitrogen contained in sewage matter at a very trifling cost, and an easy method of obtaining enormous quantities of magnesia. Up to this date, at sewage utilisation works, the extraction of nitrogenous principles from sewage has been carried on by distillation and heating; the fumes produced under this process are most offensive. The Chief of the Government School of Practical Manufacturing Science proposes to precipitate the ammonia in an available form, by the aid of free phosphoric acid and magnesia. M. Schloesing, in seeking a new method for its production, has hit upon a discovery of no small industrial importance. He obtains salt from sea-water, from which he gets a precipitate by means of lime. If this produced salt be mixed with sewage, it immediately causes the ammonia to appear in the form of a valuable precipitate. The entire series of the above operations is carried out without any application of heat whatever, and without smells of any kind.

THE POLLUTION OF THE THAMES.

By W. COLLINGRIDGE, M.R.C.S., M.B., S.Sc.Camb.,
Medical Officer of Health to the Port of London.

THE River Thames has for the last few years excited much attention, especially during the summer months, on account of its high degree of impurity and the offensive state of its waters.

Five-and-twenty years ago the sewage of London passed into the river directly from several large sewers within the limits of the Metropolis itself, and in addition to these, every house near its banks had its own particular outfall. This outpouring into a tidal river at all states of the tide naturally caused an intolerable nuisance, and without doubt must have exercised a pernicious effect upon the health of those living on or near the river. A Royal Commission investigated the whole question, and the consequence of their deliberation was the creation of the present Metropolitan Board of Works. This was constituted in 1858 with the one object of constructing such works, and dealing with the sewage in such a manner, as to prevent its discharge into the River Thames in or near the Metropolis.

Accordingly, an elaborate and perfect system of drainage has been carried out, and, except so far as the actual house arrangements are concerned, Londoners are certainly in a better position with regard to the removal of sewage than the inhabitants of any other large town. The intention was at first to deodorise the sewage at the point of discharge at Barking and Crossness, and to utilise it for agricultural purposes. But for several reasons, chiefly, we believe, on account of the practical difficulties involved in dealing with such large quantities, this part of the

scheme was abandoned, and powers were subsequently given to allow its discharge into the River Thames. This was scarcely commenced before complaints arose; and these have gradually become louder, and obviously better founded.

The quantity discharged at these outfalls is simply enormous, being no less than six or seven hundred thousand tons a day, varying, of course, from time to time, with rainfall and other causes. At first, the whole amount was poured out during the ebb, the sluice being opened just after high water; but at the present time the reservoirs have already become too small to contain the total amount, and some is allowed to run out during the flood tide. Even when the discharge was confined to the ebb, there were great complaints as to the return of the stream of sewage; but obviously, under the present system, there can be no question about this. The dark line of the sewage stream can be traced down the river most distinctly as low down as Purfleet, and at times even further, while up the river it can be followed evidently as high as Woolwich. But even where the sewage ceases to be visible to the eye, it must exercise an enormous influence in polluting the stream.

During the first week in July last year, when the temperature was exceedingly high, the whole of the river, from London Bridge to Purfleet, was of a very dark colour, and gave off a most offensive smell. Here and there were patches of a darker slate colour, and these apparently consisted of almost pure sewage. Inasmuch as the quantity of sewage increases yearly, and therefore the pollution of the river, the question becomes a most serious one.

The Corporation of London have taken the matter up strongly, in the interests of the public health, and their efforts are seconded by the Local Authorities of Woolwich, Limehouse, and other districts, and also by a large and influential Committee formed by representatives of every interest connected with the river. Representation has been made to the Home Secretary, under the provisions of the Metropolis Local Management Act, 1858, and he has promised that an inquiry shall be held before the Board of Works obtain the further borrowing powers for which they are applying. The difficulty of dealing with the sewage of 4,000,000 is obviously no slight one.

It must be well known that the original attempt to utilise the sewage failed signally, and enthusiasts will do well to hesitate before embarking in any scheme which has not been practically tested on a large scale. If such a scheme can be found to work, for it cannot be expected to pay, so much the better. The real profit will be to the land, which has hitherto lost all that it is fairly entitled to. If not, the duty of the Government, acting in the interests of public health, is plain and obvious. It must compel the Metropolitan Board of Works to carry the whole volume of sewage farther from the Metropolis; and if still permitted to run into the river, the discharge must take place many miles lower down than at present, at some point where the volume of water is far greater, and where it will be altogether impossible for the tide to return it to the Metropolis. Evidence as to its prejudicial effect upon the public health has been adduced by many eminent sanitary and medical authorities, and such evidence has been collected in abundance.

At the present time, with a low temperature, complaints as to the effects on health are naturally but few in number; but only those who are *constantly* engaged on the river can realise how the approach of the hot days of summer is dreaded. It is a fortunate thing that popular attention has been called to the matter, and the public indignation aroused. Without this healthy agitation, the Metropolitan Board of Works would have been quite content to have gone on pouring the sewage into the Thames to all time, and would have eventually converted it into an open sewer, to which state, indeed, it is even now rapidly approaching.

The evil is clearly apparent, and the remedy by no means a difficult one, that is, supposing that the idea of utilisation be abandoned. Let us trust, in the interests of sanitary science, that Her Majesty's Government may see their way speedily to remove this foul disgrace, and render the Thames, if not absolutely a clean stream, at any rate free from the sewage of London.

THE ESCAPE OF FOUL GASES FROM VENTILATING GRATINGS ON THE MAIN SEWERS OF TOWNS.*

By EDWARD FYFE G. GRIFFITH, C.E.

THIS subject is one of great importance to every individual, for, wherever a system of main drainage has been carried out with the street ventilators as usually constructed, it is patent, even to those who are ignorant of sanitary matters, that these ventilators emit foul gases. Even supposing this be not injurious to health, it is exceedingly unpleasant to all passers by.

The annoyance is most prevalent during the summer months, when there has been little rain, and it is a startling fact that it prevails in those towns which have been drained within the last twenty years on the best known sanitary principles. The main drainage of many towns is, as a system, as nearly perfect as sanitary science can make it; but, notwithstanding, the fact remains that in these very places where the best sanitary knowledge has been brought to bear, and the largest outlay of money expended, the evil is the greatest.

The public naturally asks,—Can this system of ventilation, then, be correct? And I answer,—Certainly it is, so far as the ventilation of the main sewers is concerned. The cause of the evil lies elsewhere, and it is not far to seek, although generally overlooked, and but little thought of.

There are, doubtless, instances in which the evil is principally due to the main sewers being sewers of deposit, but these cases seldom exist in towns which have been drained within the last ten years, and to which I more particularly refer.

The defective house drainage throughout the whole country is, I believe, the great cause of emanations of foul gases from street ventilators on the main sewers, and for the following reasons:—The house drains generally being drains of deposit, or elongated cesspools, the main sewers, instead of receiving fresh sewage, receive putrid sewage, it having been lying in the house drains for months, and sometimes even years.

It may be remarked that, even if putrid sewage were discharged into the main sewers, it could not create the evil complained of, being so quickly carried away. This is an erroneous idea, and, as a proof of it, I will take the following example: If the cover of an old cesspool be removed, the effu-

* Read at the Brighton Health Congress, Dec. 1881.

via will at first be most offensive, but, in the course of a few days, if the cesspool be left open and undisturbed, no perceptible smell will arise; if, however, a stick or a stone be thrown into it, so as to move the liquid, the smell will again become as offensive as at first; exactly the same principle holds good in the main sewers. The house drains gradually discharge putrid matter into the sewer; this is immediately put into motion, being churned up by the velocity of the flow into the sewer, and gives off the foul air which passes at once out of the ventilators into the street.

Again, another cause of the evil, and, perhaps, one of the most important, lies in the fact that the majority of house drains are totally unventilated, the pipes being badly jointed; the sewage percolates into the surrounding earth, and, if it be of a porous nature, saturates it. Even if the drain be laid to a good gradient, foul gases escape from this sewage-polluted earth into the house drain, and, as soon as a flush of water is discharged into it, the foul air is carried along with it into the main sewer.

Another cause of putrid sewage being discharged into the sewer, and one with which I have frequently met, is, that the house drain is connected with the overflow of an old cesspool. In town sewerage, too, especially in the older towns, cases are frequently to be met with where old sewers of defective construction are permitted to form part of the new system, and with similar results to those I have previously adduced.

The principal causes of the house drains being so frequently drains of deposit are insufficient fall, great carelessness in laying the pipes, and universal bad workmanship. Many engineers cannot insist upon the house drains being laid properly, because it is impossible for the engineer of a town, with such assistance as is usually allowed him, to give the requisite supervision. This is especially the case when a new system of drainage is being laid, when many house connections have to be made within a comparatively short time.

I am sure that engineers and borough surveyors will be the first to acknowledge that this is the case, as I have often been told by them of the absolute impossibility of paying attention to the house drainage, which is so essential.

In my opinion, the careful supervision of these details of a main drainage system is really far more essential to its success than that of the main sewers themselves, and, until this fact be recognised, not only by engineers and surveyors, but by the general public, typhoid fever, and other diseases, must inevitably prevail; besides which, there will always be a constant annoyance and expense to householders for alterations which should never have been required.

With regard to the fall given to house drains, if all the sanitary arrangements inside a house were of such construction that the water was always discharged in a body, the fall allowed for the drains might safely be considerably less than the standard which I consider necessary under existing circumstances, as, in consequence of the defective fittings inside, it seldom occurs that the water is discharged in a body, the discharge usually consisting of little more than a dribble, which almost invariably permits the drains to become choked. In making a calculation of the gradient necessary for the house drains to be self-cleansing, instead of assuming, as is usually done, that they will run half full, the velocity should be calculated on the assumption that there is only three-quarters of an inch or one inch of water in depth running in the house drain, as is most frequently, if not universally, the case. Another point that might be raised is, that it is often found impossible to give such a fall as would be required in consequence of the main sewer being too shallow. In such cases, the house drains should be provided with an automatic flushing arrangement, of which the simplest and most effective kind yet invented, as far as I am aware, is Mr. Field's flushing cistern, the principle and application of which are now very generally known.

An evil with regard to house drainage which is rapidly increasing in the neighbourhood of London, is one caused by the fact that large tracts of land are bought up by speculating companies, roads are laid out, sewers constructed under their supervision, and, when the district has obtained sufficient importance, the authorities of the parish in which it is situated, are asked to take it over, and generally do so without giving a thought to the state of the drainage.

Now, nothing can be worse than the way in which both the main and the house drains are laid by these speculating builders, the work being 'scamped' in every possible manner, whilst the commonest principles of sanitation are quite disregarded, and the most ordinary precautions neglected. In my experience I have seen many cases of this, and know of houses which have been bought of speculative companies in which the owner, after a few months' occupation, has found that his house drains have become completely choked, the cause being that the main sewer in the street has been laid too flat, and, consequently, is nothing better than an elongated cesspool.

Now, to return to the root of the evil complained of in this paper. Supposing we admit that the foul smells from these ventilators arise from defective design and workmanship in the house drainage, the question naturally arises, how can this state of things be prevented in the future?

I am quite aware that I shall raise a question in the minds of many people as to the advisability of doing what I propose, but I consider that the only real mode of prevention is, that in every house the soil-pipe should be carried up above the roof as a ventilator, so that it not only ventilates the house drains, but also the main sewers in the street. It must, however, be distinctly understood, that in advocating this as a principle, it should be applied universally, and, if so adopted, the ventilators in the street would act as inlets for air, and the soil-pipes as outlets for foul air.

I maintain that, in a properly drained town, there should be no such thing as sewer gas: this result, however, can only be obtained by paying strict attention to details. I am not speaking without experience on the subject, having lately drained and supplied with water a model village in which every house was completely redrained, and, from the time the work was completed in May last, there has been no foul air from the ventilators. If this is possible in a village under certain conditions, it is also possible under the same conditions in a town.

To do this in a town would be considerably more difficult, as the village I allude to belongs entirely to one owner, whereas in a town there would be almost as many owners to deal with as there were houses. This, is, however, the only real difficulty, and it appears to me that the only remedy is to grant to borough engineers and surveyors the right to insist upon the drainage of a house being thoroughly

satisfactory before permitting it to be connected to the sewer. They should also have the power of supervising the drainage of all new houses, and of insisting on its being carried out in an efficient manner.

I am well aware that in many districts the sanitary authorities have drawn up sanitary regulations, and that these have been sanctioned by the Local Government Board, and are, to a certain extent, enforced; but that the powers given the engineers and surveyors of these districts are insufficient is proved by the fact that these rules are invariably only partially complied with.

Frequently, also, supposing surveyors have the power of insisting on everything being carried out on the soundest principles, the staff at their disposal is invariably too small to really ensure good workmanship.

The general principles upon which house drainage is carried out must be either correct or the reverse; for instance, 'the disconnection of sinks', 'the ventilation of soil-pipes', etc., have now become almost axioms; and regulations, embodying these and like principles should, in my opinion, be drawn up by the Local Government Board, and universally enforced.

In conclusion, I may remark that, when a house is once built, it is almost impossible to remedy its defective drainage, except at a very great cost.

This arises from the fact that not only has a new system of drainage to be constructed, but that the old has to be removed, in doing which the cutting away of walls, ceilings, woodwork, etc., and the destruction and consequent renewal of paper, paint, etc., is involved. If only one small pipe passes through a room it frequently makes it necessary for the whole to be fresh painted or papered.

In consequence of the foregoing causes, people wishing to place their houses in a sanitary condition find the cost so heavy in comparison with the expected benefit to be derived and the apparent amount of work to be done, that they frequently give up the idea, or else have the old system patched, which latter is simply a waste of money as far as the result obtained is concerned. One fact is certain—that until house drains are perfectly laid, and thoroughly ventilated, sewer ventilators will continue to emit foul gases.

Last term, Christchurch College, Oxford, spent £3,000 in renovating their drainage, and now the University are forcing all letters of lodgings to see to theirs, under pain of having their licences cancelled. Notices, too, are posted everywhere warning the graduates that the city water is only drinkable when filtered, and not always then.

A high-service reservoir is being completed for the Sevenoaks Water Company, 687ft. above sea-level. The reservoir covers 1¼ acres of ground, and measures 120ft. by 60ft., and 11ft. 6in. deep, the cubic capacity being 61,000ft. It is built entirely of concrete, 1,900 yards of stone being used in it, and 395 tons of cement. The work has been carried out by Mr. Hunter, under the supervision of Messrs. Easton, and has cost £4,500.

At a recent sitting of the Court of Common Council, it was stated that the cost of the Brush electric light in the City had been about the same price as gas; of the Lontin system twice the price; and of the Siemens system 3¾ times more than gas; but the conductors of the Brush system had given notice to increase their price by 10 per cent., and the Siemens authorities to enhance their contract to an extent making it five times the cost of gas. The expense of the improved system of gas lighting in Fleet Street was four times the price of the Brush light.

ON THE NECESSITY FOR AN ALTERATION OF THE LAW RESPECTING RE-VACCINATION.*

By John W. Tripe, M.D.,
Medical Officer of Health for the Hackney District: President of the Society of Medical Officers of Health.

My chief object in this brief communication is to bring to your notice certain facts which have come to my knowledge during the late epidemic of small-pox, showing that the age at present fixed, below which payment cannot be made by the Guardians to District Vaccinators for re-vaccination, is too high. In the Memorandum issued from the Local Government Board on re-vaccination, dated the 17th October 1876, it is stated that 'in consequence of the large amount of imperfect vaccination until recent years, all persons who have been vaccinated in infancy should, as they approach adult life, undergo re-vaccination. Generally speaking, the best time for re-vaccination is from 15 to 18 years of age, but when an epidemic of small-pox is prevailing, even the age of 15 should not be waited for, especially if the marks of previous vaccination are unsatisfactory'. The Vaccination Officer is also directed that he should make it well known in infected localities that the Public Vaccinator is at liberty to re-vaccinate all persons not under 12 years of age who have not been successfully re-vaccinated. But unless persons are resident in infected localities the Public Vaccinator is not paid for the re-vaccination of any child under 14 years of age. I have found this to act very prejudicially in my district, as I examined some years ago the children attending two public schools in Hackney, and made out a list of above eighty children who were imperfectly protected by vaccination, but although small-pox was raging in the district, the vaccinator was not paid for any who were successfully re-vaccinated, except those who were above 14 years of age.

Under these circumstances I decided, at the commencement of the late epidemic, to have inquiries made concerning all attacked with small-pox in this district, as regards vaccination and re-vaccination, and now lay before you the results, as regards the ages of those attacked, amongst the vaccinated and unvaccinated. (See page 405).

It will be seen by this table that 5 children under 1 year of age, out of 1,075 vaccinated persons, or rather less than 0.5 per cent. of the whole, were attacked with the disease. The statement that these children had been vaccinated was made by the parents, and indeed the whole of the returns are based upon statements made by the friends of the sick, and not from personal inspection. During the age period of 1—5 years the number of vaccinated children attacked was 64, or 6.0 per cent. of the whole; at 5—10 years it was 117, or 10.9 per cent.; at 10—15 years it was 172, or 16.0 per cent.; at 15—25 years it was 364, or 33.9 per cent.; at 25—35 years it was 207, or 19.2 per cent.; at 35—45 years it was 95, or 8.8 per cent.; and above 45 years of age there were only 51 persons attacked, or 4.7 per cent. out of the 1,075 sufferers. There were 160 cases, or about 13 per cent. of the total number of persons affected, amongst the unvaccinated; and of these as many as 40, or 25 per cent., occurred amongst children under 1 year of age, against 0.5 per cent.

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* Read before the Society of Medical Officers of Health, March 17 1882.

amongst the vaccinated; 39, or 24.4 per cent., happened at the age period of 1—5 years, making altogether 49.4 per cent. of all the unvaccinated cases under 5 years of age, against 6.5 per cent. amongst the vaccinated. There were 33, or 20.6 per cent., at the age of 5—10 years, 20, or 12.5 per cent., at 10—15 years, 23, or 14.4 per cent., at the age of 15—25 years, and only 5, or 3.1 per cent., above that age amongst the unvaccinated.

Hackney District, Small-pox Cases 1880-81.

	Ages.	VACCINATED. 0-1	1-5	5-10	10-15	15-25	25-35	35-45	45 and upwards.	Totals.	UNVACCINATED PERSONS. 0-1	1-5	5-10	10-15	15-25	25 and upwards.	Totals.
Percentages.	Totals.	5	64	117	172	364	207	95	51	1075	40	39	33	20	23	5	160
	Small-pox cases.	0.5	6.0	10.9	16.0	33.9	19.2	8.8	4.7	100	25.0	24.4	20.6	12.5	14.4	3.1	100
		6.5									49.4						
	Population.	12.9		11.1	10.0	20.4	15.8	11.5	18.3	100	12.9		11.1	10.0	20.4	45.6	100

Vaccination unknown, 71.

A comparison of the number of vaccinated persons attacked, with the population of the Hackney District, showed that, in proportion to population, the percentage who suffered at the age period of 0—5 years was only 6.5, against 12.9 per cent. of population; whilst at 5—10 years it was 10.9, against 11.1 population; at 10—15 years as much as 16.0, against 10.0 population; at 15—25 years no less than 33.9, against 20.4 population; at 25—35 years it was 19.2, against 15.8 population; and above 35 years of age the percentage of those attacked was below the percentage of population at that age living in the district. Amongst the *unvaccinated* by far the greatest mortality occurred amongst children under 5 years of age, as nearly 50 per cent. of all the unvaccinated cases happened at that age period, against a percentage of 12.9 amongst the population of that age. The percentages of attacks exceeded the percentages of the population at the ages 5—15, but after 15—25 years the proportion of unvaccinated persons who suffered from small-pox was below that of the population above 25 years of age.

It may be said that these statements form no part of the title of the paper, but I thought they might be usefully introduced as showing the large amount of protection afforded by vaccination to young children. The chief points, however, which I wish to point out are, that the protection afforded by vaccination, as carried out some years ago, that is to say, before the passing of the Amendment Act in 1871, when arm to arm vaccination was comparatively rarely practised, diminished before 10 years of age was reached, as there were 10.9 per cent. of cases at the age period of 5—10 years, against 6.5 at 0—5 years, and 16.0 per cent. at 10—15 years, against 10.9 per cent. at 5—10 years of age, although the percentage of population had diminished from 12.9 to 11.1 and 10.0 per cent., respectively, at these ages.

I now propose relating the results of my examination in 1881 of a number of children attending one of the schools supported by voluntary contributions in this district. At the request of the Managers I examined 197 children under 12 years of age, when I found that 29 had bad marks, and 7 no marks whatever, the whole of the latter having not been vaccinated, making a total of 36, or nearly 20 per cent., who were unprotected, or nearly so, against an attack of small-pox. The marks of those who were under 7 years of age were much more visible than amongst the children above that age. I was subsequently informed that the whole of the 36 children were vaccinated, or re-vaccinated, by a private practitioner, and that all took. I may say in regard to this that I do not attach a very great deal of importance to this statement, as the local manifestations from re-vaccination are held by the best authorities on the subject to bear no specific relation to the susceptibility of a given person to small-pox.

Under these circumstances I think I have made out a good case for the reduction of the age at which Guardians may be empowered to pay District Vaccinators for the re-vaccination of children whose vaccination marks are such as to show that they are not properly protected against an attack of small-pox. I would, therefore, propose that the age at which Boards of Guardians may pay for revaccination be lowered to 12 as regards all children, and to 10 amongst those who are living in an infected place. Whether or not re-vaccination at so early an age will afford reasonable protection in future life I am not prepared to say, but I think it much better that a person should be vaccinated three times than run an unnecessary risk of losing his life, or being permanently injured by an attack of small-pox.

THE SINS OF THE PLUMBER.

By W. K. BURTON,
Resident Engineer to the London Sanitary Protection Association.

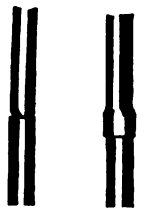
III.—DEFECTS IN SOIL-PIPES.

THE defects in soil-pipes are chiefly such as lead to leakage, occasionally, of the liquid passing down them, but more frequently, of the gas which is generated in them and in the drains. This is apart from defective ventilation, which I propose to treat separately. The actual stoppage of a soil-pipe is a very uncommon occurrence, that is, the stoppage of the soil-pipe itself. If there be a trap at the foot of a soil-pipe, it may occasionally become choked; but the fault here lies in the trap, not in the pipe. Occasionally, one sees a considerable length of soil-pipe almost quite horizontal. Of course this is liable to become choked just as a drain is; but the chances are smaller, as there is less likelihood of obstruction of any kind. I have, however, seen a case where a considerable length of soil-pipe was laid horizontally in an exposed place, and where it had been almost completely flattened, simply by being kicked by the feet of passers by. Of course there was a stoppage here. The fault lay in using lead pipe which was not heavy enough, and in not boxing in the work after it was done.

In investigating into the cause of leakage, which, as I have said, is the chief fault in soil-pipes, I shall first consider the question of the material desirable to use, and of the manner in which the lengths of pipes should be jointed, and shall afterwards give a few extreme cases of faults which have come under my notice.

Before considering the question of material, it may be as well to say a word as to position of a soil-pipe—whether it should be inside the house or outside. This is a question on which there has been considerable argument, and I think that too much stress has been laid upon it. For my own part, I prefer to see the soil-pipe outside the house, where it is possible to arrange it so; but there is no reason why so sound a piece of work should not be made that it would be quite unobjectionable to have it inside. The chief drawback in having it inside seems to me to be, that it is often difficult to make it accessible for inspection and repairs throughout its length.

To return to material. We have the somewhat vexed question as to whether it is permissible to use any material other than lead for a soil-pipe inside a house; that is, whether a sound job can be made of iron pipes—few would attempt to use zinc. I do not think that in the minds of those who have tested many iron soil-pipes there can be much question in the matter. I should say that, of the many I have tested, about two out of three proved leaky. It may be said that this must be due to careless work, and that it ought to be possible to make an iron pipe as tight at the joints as a lead one. I do not think that it is possible, without an amount of trouble which would make the iron pipe more expensive than the lead one. In the first place, heavy cast-metal pipe would need to be used. I have seen more than one case in which the joints in a pipe of the usual rain-water kind had been very carefully made, but in which several lengths had split from end to end. With the heavy pipe it is quite possible that, by using Spence's metal, or even with red lead and hemp, the joints in the straight pipe might be made tight; but it is at the junctions from the closet traps that the greatest difficulty would be met with. I know of no satisfactory way of making a perfect joint between a lead and an iron pipe, except by methods which are quite impracticable for ordinary house plumbing work. As a practical fact, when a plumber has such a joint to make, he slightly widens out his lead pipe and slips it over the end of the iron pipe. This is called a slip joint, and if the plumber is a very careful man he may paint it or rub a little putty into the space between the lead and the iron.

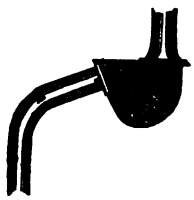


Slip-joints between lead and iron.

I think it will be admitted from this that iron is quite an unsuitable material for soil-pipes inside a house; and I think we must class the fixing of them amongst the sins of the plumber. If we do, it certainly is one of the most common. I have seen several instances of houses in the best parts of London, where the soil-pipes were of iron, and in one or two instances leaking so much that the liquid could be heard dropping down inside the casings.

Granted the necessity for using lead only for soil-pipes, we come to the very commonest sin of the plumber, and one which is peculiar to the plumber proper; that is, the use of 'light lead'. The lead used for soil-pipes should *never* be less than what is known as 7 lb. lead, that is, it should be of such a thickness as to weigh 7 lbs. per superficial square foot. It would be better to use 8 lb. lead; yet, it is a fact that, in London, probably not a quarter of the soil-pipes which are fixed are of more than 5 lb. lead, whilst many are even lighter. I have seen some so thin that it was possible to indent them with the pressure from one's thumb.

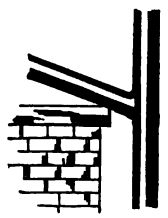
A pipe made of such thin lead may be quite gas-tight for some time, but before long it will be coroded through, and this particularly if it be not thoroughly ventilated. There is nothing more common than to find the upper part of an unventilated soil-pipe and the closet trap at the top of it 'holed', that is, quite eaten through at many places. I illustrate a state of



affairs which is often to be seen. Sometimes a test applied to the pipe will not discover these holes. They are covered with a thin scale, which actually seems to make the pipe gastight, but the first time there is any disturbance the scale gives way and the drain is ventilated into the house. There is a limit to the life of even the thickest pipe, specially if it is not ventilated, but doubling the thickness seems to far more than double the length of the pipe's existence.

What is known as 'hydraulic' or seamless pipe is preferable to hand-made pipe. The plumber prefers the latter for the same reason that he likes the D-trap. He makes it himself and charges a profit on his work.

The points at which defects are most common in soil-pipes are the junctions of the branches from the closet-pipes to the vertical part of the soil-pipe. Very frequently these joints have not been properly wiped at first, and often they give way from a settlement of the vertical part of the pipe. A long length of soil-pipe is very heavy, and it is necessary to support such a pipe at short intervals by 'tacks', as they are called. These are pieces of sheet lead soldered to the pipe and fixed to the wall. If they are not placed at small enough intervals the weight of the pipe is too much for them, and often they tear away, leaving a hole in the pipe. They may not actually tear the pipe, but may leave the whole weight of it resting on the branches from the closets. I have seen a branch torn open from this cause, as is shown in the annexed cut.

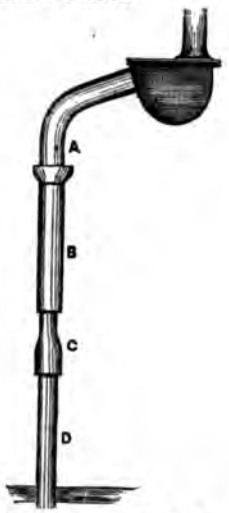


So far, I have assumed that the pipes had soldered joints, but I have known a case where a long lead soil-pipe had been fixed with putty joints throughout. Here, evidently, the architect had specified a lead

pe, probably mentioning the weight of lead to ed. The contractor had fulfilled the letter of ecification, but had certainly failed to satisfy irit of it. The lead pipe so jointed was much than an iron pipe.

nust not be supposed that the defects which e been enumerating are by any means rare. f several hundred houses which I have inspected he London Sanitary Protection Association g the last twelve months, about one-third have 1 leakage from the soil-pipe direct into the . It is true that in about one-half of these the leakage occurred at the junction between il-pipe and the drain. This has already been oned as a weak point. Still this leaves about per cent. of houses with leakage in the actual pe. These faults, I have said, are quite com-

There are others, which if not quite so fre-ly met with, are occasionally. Thus the plumber sometimes to have a curious fancy for making s soil-pipes of alternate short lengths of iron ad. I have explained that a junction between nd lead is the most difficult of any to make ht. By the beautiful device just mentioned, lumber manages to get the greatest possible er of such joints into a given length of pipe. I een two cases where a soil-pipe was made up of ort piece of lead pipe, one of stoneware, and iron; and this all within the short distance of feet! In each case there was a defective at the top of this arrangement! I here ate the state of affairs.

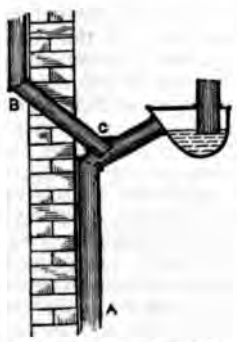


A, Lead; B, Stoneware: C, Lead; D, Iron.

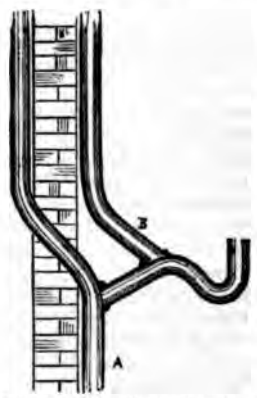
far I have considered only soil-pipes inside a ; when so fixed the danger from leakage is st, and therefore any fault is most serious. too common, however, to suppose that when pipe is fixed outside it may be fixed anyhow. s a great mistake. When, as often occurs, the e soil-pipe passes up close by a row of windows, uld be almost as carefully made as if it were the house, and I consider it doubtful whether hould be permitted. I have frequently seen an ipe fitted up without anything in the joints at d on pouring peppermint and hot water down n the roof, the smell has been perceived in room which had a window near it. Of course, the peppermint smell was perceived there was ntly present a certain amount of drain-gas, although from the less pungency of its odour it might not be perceived.

It must be further recollected that, in the case of each closet, there is a branch from the iron pipe into the trap inside the house, and that if the pipe should be so fixed that it may settle, the joint next the trap is very liable to be cracked, especially if this be a D-trap.

One of the commonest points for leakage to occur at, is at the junction between the soil-pipe and the ventilating pipe. One of the great advantages of an outside soil-pipe is that it may be carried straight up, the same size, from the bottom of the building to a point clear of the roof. When the soil-pipe is inside it is usual to turn out through the wall with the ventilating pipe making a swan necked bend. If this bend be of lead and be properly soldered, or wiped, into the soil-pipe it is unobjectionable; but there is nothing more common than for an iron or zinc pipe to be used and for the joint to be made with putty. I illustrate the manner in which the ventilating pipe should be fixed, and the manner in which it too commonly is fixed.



Soil-pipe Connection as it frequently is.
A, 5 lb. lead; B, Zinc; C, Putty joint.



Soil-pipe Connection as it ought to be, with wiped joints.
A, 8 lb. lead; B, Anti-syphonage pipe.

I must not omit amongst the causes of leakage that where a closet has been abolished, and the branch from it cut off and not properly sealed up. I have been told by those who have seen them, of cases where no attempt has been made to close such a branch, but cannot say that any such have come under my own observation. I have, however, known cases where the sealing has been very imperfectly done. I remember one where the pipe had been simply hammered up, a considerable space being left through which sewer gas issued.

VACCINATION GRANTS.—The following gentlemen have received the Government grant for efficient vaccination:—Mr. G. A. Hicks, Public Vaccinator of the Bushey District, Watford Union, £15 12s. (second time). W. L. Emmerson, L.M., M.R.C.S., Public Vaccinator of the Waltham District, Melton Mowbray Union, £5 12s.

A Sanitary and Industrial Exhibition was opened at Jarrow-on-Tyne by the Mayor on the 28th ult. Several novel sanitary appliances were on view, and amongst many other objects of interest, there were shown some improved modes of illumination with gas, possessing the advantage of greater economy, with a purer and more brilliant light than ordinary burners.

Mr. Alderman Ingledew, of Newcastle-on-Tyne, recently entered on his 97th year. The venerable Alderman still retains all his faculties.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

XII.

DOULTON WARE.

TILES and pottery generally, as applied to walls and floors for the attainment of perfect cleanliness, and for decoration, have always attracted the attention of architects from the first dawn of civilisation, as can be attested by a visit to museums where ancient specimens of Assyrian, Babylonian, Chinese, and other pottery is kept for the wonder of succeeding ages, who even now, for the most part, are still puzzling themselves as to how the glazes and enamels of these nations were prepared. In later times followed the Indian and Greek forms of pottery and glazes, and afterwards Roman, mediæval, and modern adaptations. The history of the potter's art forms certainly one of the most interesting episodes in the history of mankind.

It is fortunate for lovers of art in the present day that they live in a time when nearly all that apparently can be done has been done to supply them with beautiful and durable specimens wherewith to adorn their floors and walls. Tile decoration, thanks to the never-ceasing exertions of some of our manufacturers, has now reached almost a national standard amongst us, and for this we are very largely indebted to the initial taste and perseverance of Messrs. Doulton and Co., and to the assistance rendered them by the masters of art schools, called in to help them. The result of all this can be seen upon the Albert Embankment in the shape of most extensive studios, where all kinds of enamelled tiles, or tiles in underglaze colours, are manufactured. In preparing the enamel tiles, the decoration is painted in enamel colours upon the glazed body, while in the other, the decoration is executed on the biscuit ware, and glaze put on afterwards. Both systems yield beautiful results, but whilst the enamelled specimens are more brilliant perhaps, the underglazed ones are the more durable. Both, however, have their several exact places in modern æsthetics. For the rest, tiles are largely superseding all other materials for walls and floors, that is, where this kind of treatment is at all desirable. They are also cleanly, durable, and cheap; and a great incentive to their continued use is the facility which Messrs. Doulton give to architects in allowing them to inspect the work during its progress. It is quite impossible, however, to treat at further length upon this branch of the subject, and we will simply conclude by urging a visit to the show-rooms, and a study of the catalogues.

It is not our purpose now, either, to descant upon the marvellous adaptation of ordinary terra-cotta to architectural purposes. Anyone who has visited Italy or Prussia will have seen the early and late representations of this material, and be able to do justice to it. We have specimens in London, as, for instance, in South Kensington, though with certain demerits, owing to hasty production. But this is not a fault of the material, which will endure when stone has frittered away, bricks perished, and metal become wasted by the action of the loaded atmosphere. The stoneware panels which have been produced also have excited the attention of artists of the first rank, who have vied with each other in hailing the advent of this new departure in art; and specimens can now be seen in most of our cities. And if the student seeks to see the very rapid progress which has been made with the old and new wares in the shape of architectural decoration, both internally and externally, and with and without colour, he has only to examine in detail the Lambeth Pottery extensions erected by Messrs. Doulton, and he will be able to note what may be done by a judicious combination of terra-cotta and Doulton ware.

But I must dedicate the rest of this article to the more decorated wares prepared by Messrs. Doulton, and will choose out of the art field some of the vases produced by them. It will be impossible to give in detail the eight or more heads of method which classify the schemes of decoration applied to Doulton ware, or say what trials are in preparation for the production of something new. Neither can I enter upon the details of how the excellent combinations of colour have been achieved, and which gives the Doulton ware its high position. Suffice it to say, that the bronze, green, brown, black, blue, chocolate, jasper, grey, and white, and many combinations of all, in the way of lightening, of interpolating coloured clays in strips, and the like, are all included.

Fig. 1.

Fig. 1 shows a beautiful source of decoration, due to the manipulation of the clay whilst plastic, and in the 'thrown form' of preparation. This treatment is full of advantages, and no one could limit the designs in margins, flutes, and frills which a tasteful designer could add to saucers, dishes, plates, and vases treated in this manner. There is no end, either, to the

Fig. 2.

adaptations of shape which can be afforded. For instance, a circular bowl, as thrown on the wheel, can be converted into a square, polygonal or an elliptical one, or a shape combining all three. Then, again, it can be pierced and depressed as in Fig. 2. The artist can simply do what he wishes, and give full rein to his creative fancy.

The productions at Messrs. Doulton's schools cover, however, a far more extended field than the above, and some most charming paintings in coloured

birds especially, see Fig. 3) are to be Tinted wreaths of vegetable forms, and f geometrical order—everything—can be ın by a tasteful artist with the best effects;

Fig. 3.

. it is added that the gouge and the chisel, ossing and stamping tool, can be used with the truth of this last statement will be

now say a few words about Lambeth faïence, is meant earthenware which is not white, posed of any number of natural clays, ıth their sufficiently extensive range of ıd by the union of underglaze colour and ır even overglaze upon them, can be treated the simplest or most elaborated manner; matter of course, in this ware there can be ɔration in colour, and an effect once pro- fitted to remain throughout the ages. A ;ample of the effect of an ordinary treat-

Fig. 4.

ven at Fig. 4, and it may here be said that ıothing in ancient or modern ware which imitated, if needs be. Even the best of Rhodian, Persian, Chinese, and Japanese designs can be reproduced by skilful hands.

Some of the artists employed by Messrs. Doulton have the distinguishing gift of adapting every kind of pictured design and colour to every kind of producible form, and the effects produced are, of course,

Fig. 5.

most excellent, and vary only with the individualities of the artists themselves. No. 5 vase is an example of this, and there are just as many untried, as tried, sections of pottery decoration.

In conclusion, I may say that it has been a labour of delight to lay before the reader these short histories of the Doulton manufactures, and it is hoped that, though short, they may have proved useful. They could be rendered more so, doubtless, after a sound revision, but that must here be forbidden for sake of space. One parting remark must be made, and that is, that to Messrs. Doulton are due the thanks of all the British people, to say nothing of foreigners, for to their enthusiasm and astounding perseverance is due, not only an establishment that is producing hitherto unrivalled works of art, but that is daily furnishing, by purely local means, the Useful as well as the Beautiful.

Colonel Haywood's recently issued report on the works executed by the Commissioners of Sewers during 1881, shows that the total length of sewers constructed during the year was 1856 cubic feet. The report deals with, amongst other subjects, sewers, house drainage, dangerous structures, improvements, public urinals, chalets, standposts, water supply, scavenging and dusting, snow, burning refuse, City cemetery, and Artisans' and Labourers' Dwellings Improvement Acts of 1875 and 1868.

VACCINATION WITH ANIMAL LYMPH.—In consequence of a recommendation from the Medical Department of the Privy Council, the Registrar-General, acting under the instructions of the Local Government Board, has caused printed notices to be issued to all the registrars of births and deaths throughout the Metropolis, to be followed by a similar distribution in every registration district of the kingdom, to be handed by each registrar to every informant upon registration of a birth, one of such notices regarding new regulations with respect to vaccination. By these notices the parents of children registered are informed that, instead of being compelled to have their children vaccinated in the ordinary manner, they can now have them vaccinated, at their option, with animal lymph, if they choose to go to the stations assigned to the public vaccinators acting under the instructions of the Local Government Board, the addresses of which are given, with the names of the vaccinators appointed for the purpose.

THE
SANITARY RECORD.
APRIL 15, 1882.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

WATER COMPANIES AND THEIR POWERS.

DR. DUDFIELD, the Medical Officer of Health for Kensington, in one of his recent reports, discusses at considerable length the powers of the London Water Companies. It is of course a thrice-told tale, but nevertheless, only by incessantly hammering at the subject is there any chance of redress being obtained. Publicity is the one thing which the Companies dread, and that being so, in publicity resides the chief hope of bringing them under control. As regards the Metropolis, there underlies the controversy the yet greater question: How, when, and by whom, are the Metropolitan Companies to be bought up? We infer from Dr. Dudfield's remarks that he, like many other people, regrets that the late Conservative Government was thwarted in its policy as to this matter. High as might have been the cost of the purchase under Sir R. Cross's scheme, yet the transfer would by this time have been accomplished, whereas now it seems indefinitely postponed, Nero meanwhile fiddling. By common consent amongst those who are experts in such matters, the saleable value of the shares and property of the London Water Companies is steadily increasing, year by year, and the longer the transfer is postponed, the greater the cost which it will involve.

But this is not the only, nor, in some sense, the greatest evil. In the meanwhile the general Public are suffering from a tyranny which is as bad for our pockets as it is for our health. One very striking illustration of this is mentioned by Dr. Dudfield. If an occupier fails to pay his water-rate, the Companies may cut off his supply. This power in itself is sufficiently objectionable, water being a necessity of life which cannot be dispensed with as gas may be; but there are incidents connected with this cutting-off power, which render it doubly iniquitous. In all large towns, but in London especially, there are, of course, a great number of houses sub-let, so that one individual owner or occupier may be the Water Company's customer, but several families may participate in the supply. Now comes the serious point. The one occupier, or, it may be, non-resident owner, may be in default with his water rate, and the Company proceed to cut off. The Company's servants, when they go to the premises, are not allowed to take money, that is, to receive payment of the rate, even if the lodgers offer to pay, rather than lose their supply of water. However accidental may be the owner's default, the full punishment must be meted out to him. He must be fined, on the *ipse dixit* of a Water Manager sitting *ex parte* as a self-made court of summary jurisdiction, the amount of the expenses of laying on the water again, perfectly regardless of the health and comfort, it may be, of a dozen innocent tenants or lodgers. There is a vindictive tyranny about the whole proceeding which deserves the strongest condemnation. Doubtless in many cases the water is soon again laid on, and the inconvenience to the tenants is not very great, because not of long duration. Nevertheless, there are subsidiary mischiefs; for instance, the repeated digging of holes in the public roads and pavements is both inconvenient to the public, as represented by foot passengers, and detrimental to the condition of the roads as roads.

Dr. Dudfield does not content himself, however, with merely the foregoing points. On the contrary, he shows up the Companies along the whole line. Specially he draws attention to the fact that the Companies have grievously neglected certain Regulations framed under the 'Metropolis Water Act, 1871', and sanctioned by the Board of Trade. One of these Regulations provides that no overflow or waste pipe other than a 'warning pipe' is to be attached to any cistern, for the obvious reason that such pipes, as formerly fixed, were little else but efficient channels for the conveyance of sewer gas into cisterns, and so into houses. Dr. Dudfield considers that this restriction, so highly important from a sanitary point of view, is systematically neglected by the London Water Companies for the reason that as it only involves health matters, and not £ *s. d.*, therefore it is of no concern to the Companies. Then again—and this is a grievance which is in operation in many other parts of England besides the Metropolis—on what ground are water consumers compelled to pay quarterly in advance? Payment in advance for a thing is always inconvenient and often unreasonable, even when the purchaser is sure to get what he contracts to buy; but in the case of London water it is far otherwise. The contract is to deliver a constant supply in good quantity of pure wholesome water; whereas it is notorious that though a great improvement has taken place of late years, the supply of water in London is very far from being either (1) constant, (2) abundant, or (3) pure.

Space forbids us from entering more fully into this matter on the present occasion; but Dr. Dudfield has rendered good service by exposing some of the iniquities of the existing water system of London, and his remarks are the more valuable in that they represent the matter from the standpoint of an experienced Medical Officer of Health.

'BLACK SMOKE.'

aw respecting black smoke is, we fancy, very ectly understood by the general public, espe- in the South of England, though, probably, it rwise as regards the North. Judging by what ten sees in the South, neither chimney owners, eir neighbours generally, comprehend how and how stringent are the provisions of the signed to prevent the air we breathe, and the we inhabit, from being unduly polluted by evolved in connection with manufacturing ses. Perhaps it may not be amiss for us to , in a simple form, the present state of the to this matter, especially as a case has just ecided by the magistrates at Ivybridge, in hire, which raises some highly interesting and nt, albeit very simple issues.

statute law may be said to group itself under eads: there are enactments regarding smoke Public Health Act, 1875'; then the 'Railways' Act, 1845', as extended by the 31 and 32 . 119, and the 'Locomotives on Roads Act, ontain prohibitions as to locomotives on s and highways emitting smoke; and, finally, s 'Lord Palmerston's Smoke Act' of 1855, deals with the production of smoke from s within the Metropolitan District and with ed to be a frightful nuisance, namely, the mitted by steamers on the Thames. We will r this last branch of the subject as one which said to be, in great measure, done with, and offer a few remarks on the smoke provisions tatutes previously mentioned.

Public Health Act, 1875', under the generic 'nuisance', includes 'any fire-place or furnace loes not, as far as practicable, consume the arising from the combustible used therein, ch is used for working engines by steam, or mill, factory, dyeing house, brewery, baker r gaswork, or in any manufacturing or trade whatsoever, and any chimney (not being the r of a private dwelling-house) sending forth moke in such quantity as to be a nuisance'. guage is sufficiently clear, and if the Section tion (No. 91) were properly handled, no r ought ever to be experienced in the putting to execution. There have been several s on it in the superior Courts, and we are re of any difficulties having arisen, although per to state that, seemingly, a smoke nui- roceeding from mines or mineral works is, by the 334th Section, protected, even though a injurious to health does arise therefrom.

enactments contained in the 'Railways' Act', and the other kindred Acts, are to the at every locomotive used on a railway or must consume its own smoke, under a not exceeding £5 per day. In the case of *chester, Sheffield, etc., Railway* v. *Wood*, in hitch arose, it being held that the penalty ched where the engine was not constructed so as to consume its own smoke, and therefore where an engine was duly constructed, and the nuisance was due only to careless user, it was held that there was no liability under section 114 of the Act. The somewhat narrow principle of this decision does not, however, seem in practice to have been productive of much inconvenience, for, in later cases, Railway Companies have been successfully prosecuted. But even without going the length of a prosecution, much good may be done by a vigilant Sanitary Officer. Some years ago, great complaints were made at Bromley of smoke from the engines of the London, Chatham, and Dover Company; the nuisance, however, was, we believe, abated without difficulty by the Surveyor of the Local Board serving warning notices on as many engine drivers as he could get hold of who were in the habit of passing over lines in the Bromley district.

Proceed we now to consider the Ivy Bridge case, to which we have already alluded. The facts were exceedingly simple, the more so that one of the defendants was also chairman of the Local Board, which Board, by a curious coincidence, had decided that its interference was unnecessary. The defendants were paper-makers, and owners of a mill with a large chimney; the plaintiff was a retired Indian official, who had built a house within a quarter of a mile of the aforesaid mill. The chimney of this mill being constantly in the habit of giving forth immense quantities of smoke, the plaintiff brought the matter under the notice of the Local Board, which declined to do anything. He then conducted some enquiries at Birmingham and Derby, with the result that he became convinced that appliances were in existence which would obviate the nuisance complained of. Armed with this information, he addressed himself to the defaulting mill-owners, and what do our readers think was the answer he got: 'We are prepared to open our doors to you to make any improvements at your own expense; if, however, the experiments prove effectual, we will refund every farthing to you.' This was, indeed, adding insult to injury, and, of course, only incited the aggrieved house-owner to make a determined stand for his rights. The necessary legal notices were given, and proceedings naturally were taken to enforce the law by a summons to appear before the County Justices. The evidence showed plainly enough the reality of the nuisance, and it also came out that the defendant, being chairman of the Local Board, was present at the Board meeting when it was decided that the Local Board need not interfere. One of the witnesses for the defence was the Inspector of Nuisances, who, in cross-examination, confessed he had 'once expressed the opinion that a nuisance existed, but now wished to withdraw that statement', a remark naturally received in Court with derisive laughter. In the end, after a hearing of six hours, the Court convicted the defendants, and issued an order giving them two months to abate the nuisance, and requiring them to pay the costs.

We have discussed this subject somewhat fully for the very reason that the Ivybridge case is so simple a one, by which we mean, one disclosing a nuisance of constant occurrence, and easy of remedy as a matter of law. Black smoke from large chimneys is an intolerable nuisance, yet it is often acquiesced in, especially in the South of England, probably because the sufferers are not aware of the claims they can sustain, on the help of the law, and of the ease with which, in general, they can obtain redress.

'PECULIAR PEOPLE.'

THE political lawlessness of the present times is beginning to yield some fruits of a very serious character as regards all organised efforts to promote public health. What with anti-vaccinators, 'Peculiar People', and other fanatics of these types, those concerned in working the various public health laws are beginning to meet with increasing difficulties, which are really, in many towns, becoming very threatening. Even in regard to the elections of Poor Law Guardians, which are taking place this month, in many localities the issues raised have nothing to do with the fitness or unfitness of particular candidates, but are made to turn solely on the point as to whether they are *For* or *Against* compulsory vaccination. The matter has reached such a head, that it is no longer sufficient for the medical profession, and the respectable classes generally, to content themselves with the knowledge that vaccination is a safeguard of the highest value against small-pox—they must exert themselves to prove this in every direction to their ignorant and unthinking neighbours; or the mischief caused by the efforts of the fanatical party will become chronic and alarmingly widespread. In point of fact, we are very much inclined to think that the time has come for the formation of a society for upholding vaccination, to counteract the mischievous influence of the Anti-Vaccination Society, which is now hard at work in London, and doing an immense amount of harm.

The 'Peculiar People' came before the judges at Westminster a week or two ago, with a result which, though seemingly justified by the evidence on points of law, is certain to be productive of very unfortunate results. In the case of *Reg.* v. *Morby*, a 'Peculiar People' man was convicted by Mr. Justice Hawkins of manslaughter, in feloniously causing the death of his child by neglecting to provide proper medical attendance. No medical man attended the deceased during life; but a doctor, who had made a *post-mortem* examination of the body, stated that death was undoubtedly due to small-pox. He gave evidence to the effect that small-pox is a disease requiring medical advice and skill, and great attention and care, and that, in his judgment, if medical advice and assistance had been called in, the death might have been averted altogether—at any rate, life might have been prolonged. The Judge submitted the evidence to the jury, reserving the point of law as to whether the evidence was sufficiently strong to sustain a charge of manslaughter. The jury found the father guilty; and the point of law, having been reserved, came before the Court at Westminster. The decision of the Court, presided over by Lord Coleridge, was that the conviction could not be supported. Lord Coleridge remarked that it was not enough, in order to sustain a conviction for manslaughter, to show a neglect of the legal duty: there must also be evidence to show that the neglect to take reasonable means to prolong life had had the effect of shortening it; and the utmost that the medical man had felt himself able to say was, that 'probably it might have done so'; and then he qualified these words by adding, 'I cannot say more, not having seen the case.' Lord Coleridge then proceeded to say that it would be dangerous, upon such evidence, to allow the conviction to stand. They must, before doing so, be satisfied, by affirmative proof, that the death was caused by the neglect; and when all that a skilled and competent witness could say was, that 'probably' it might have been so, the Court could not be satisfied; and therefore the conviction must be quashed.

It is impossible to call in question this view of the case in its legal aspect, and therefore, in that sense, no more can be said on the subject; yet the painful fact remains, that it is in the power of fanatics, influenced by mistaken religious feelings, to allow their relatives to fall ill and die, without the possibility, save in extreme cases, of the consequences being brought home to the inhuman offenders against religion and common sense—for, with every desire to respect conscientious scruples at all times, we cannot but consider refusal to accept medical advice, in a small-pox case, to be criminal folly.

NOTES OF THE MONTH.

FRIENDLY LEADS AND SMALL-POX.

Some startling, and, we fear, but too typical, instances are recorded by Dr. G. P. Bate, in his last annual Report on Bethnal Green, of the ways in which infectious diseases are spread. Dr. Bate states that no less than eight cases of small-pox occurred at one house, amongst the members of two families. In both cases the parents obstinately refused to permit their children to be removed to the hospital, and the Medical Officer did not feel justified in obtaining a compulsory order. Three of the children died. After the death of one of them a 'friendly lead' was held at a neighbouring public-house for the purpose of raising funds for the funeral expenses. This was attended by the parents and friends of the dead child, and in all probability in the very clothes they wore while nursing it, for the postman and several persons who attended the 'lead' took the disease, and at least one died of it. In another case the owner of a house actually let his premises to new tenants without having the house cleansed and disinfected, after three cases of scarlet fever had occurred there. Notices were served in the ordinary way; but the landlord, instead of doing the work, turned his tenant out and closed the house.

wards it was found that the premises let; a man, his wife, and a young family lence there. No cleansing or disinfect- done. The landlord was rightly sum- we are glad to say, mulcted in a sub- lty.

THE ALKALI ACTS.

s 11 and 12 of 'The Alkali, etc., Works ct, 1881', provision is made for the regis- e works to which that Act applies, sub- ions to be prescribed from time to time Government Board. That Board has n Order prescribing that the registration der the Act is to be at their office, and all applications for Certificates of Regis- y works are to be addressed. Such ap- ust contain the following particulars:— ription of the work and its name, if any; sh or place where the work is carried date when the work was erected; (*d*) is closed, the date of its closure; and, ne and address of the owner, lessee, other person carrying out the work. of a work erected after the first day of , or which has been closed for a period nths, the work is to be furnished with ces as are required by Section 12 of the ificate of registration is issued by the nment Board, upon the receipt of the payable under the Act. When any s in the ownership of a work, or in any lars stated in the Register, and written f is given to an inspector in accordance visions of the Act, the inspector is to notice to the Local Government Board, ster is to be amended by inserting such cordingly, an endorsement being made d to the effect of the alteration. For of carrying out the new Act, the staff of Department of the Local Government been considerably enlarged; provision ade for the chief inspector with two as- inspectors and four subinspectors.

TITION FOR A MODEL THEATRE.

mittee of the Hygienic Exhibition held Berlin have decided to open a competi- gns for a Model Theatre. As prizes for st solutions of the problem they offer of 8,000 marks. The designs are to be ater than midday, August 5, 1882. The o be fulfilled in the model theatre are the programme as follows:—There are or 1,700 persons, exclusive of a certain standing room. While ample corridors, robes, and buffets are to be provided for , the *personnel* of the stage and orchestra he following apartments for their accom- a general assembly or sitting-room for a; six dressing-rooms, each for one per- professional staff; six larger ones, for six persons each; and six still larger, enty to thirty persons each, including nd supernumeraries. Near the stage so to be a conversation-room, and three ractice and rehearsals. There are like- rovided in the building, dwelling apart- housekeeper, and rooms for the acting anagers, for a medical man, and for the library. Store-rooms or magazines are to be provided, capable of containing 100 sets of decorations, besides furniture, wardrobe, and other stage properties. Suitable accommodation is likewise to be found for the lighting-apparatus, the watchman, and the stage workmen. The lighting of the theatre is supposed to be by gas, but the arrangement is to be such that electricity may be readily substituted without serious building alterations. The heating apparatus is to be capable of producing a temperature of about 59° Fahr. for the staircases, vestibules, and corridors; about 64° for the auditorium, stage, and adjoining parts; and 68° for the dressing-rooms, when the cold outside, in the open air, is as low as 4° below zero. As regards ventilation, the arrangements must be such as to render it possible to introduce 25 cubic mètres of fresh air per head of the audience per hour, and as much as 35 cubic mètres in case of excessively hot weather. The air in the stage division is to be renewed twice an hour, and to be capable of being kept tolerably cool in the excessive heats of summer. Along with the drawings the committee also require a description showing how the audience are to pass in and out of the house, and the time within which the auditorium can be cleared without danger. The space to be allowed per head of the seated audience is fifty centimètres in breadth and thirty in depth. The rate at which the stream of persons leaving the house is calculated to move is to be proved from the form, gradient, and general construction of the passages and exits. The committee adds that it attaches much more weight to the satisfactory solution of the questions of safety raised by the recent calamities at the Nice and Vienna (Ring) Theatres than to the other architectural details.

BREAD ANALYSIS IN MASSACHUSETTS.

A recent report of the Massachusetts Board of Health gives the following interesting particulars as to the analysis of samples of bread bought in the State. One hundred and three samples of bread were tested for alum. Of these seven were known to contain it, and two known to be free from it. Of the remaining number, seven contained a very small quantity, less than one-tenth of one per cent., and eighty-eight were entirely free from it. These ninety-five samples were purchased from as many different bakehouses, without it being known to the baker for what purpose the bread was to be used. Twenty of these samples were also incinerated, and the ash examined for other mineral adulteration—but none was found. All the bread examined looked, smelled, and tasted well. The moisture was estimated in thirteen samples, and varied from 31.42 per cent. to 65.27 per cent. Only four of these contained over 38 per cent. The fat was estimated in house-made and in baker's bread. The two samples of home-made bread gave 1.12 per cent. and 1.17 per cent.; four of baker's gave 1.33 per cent., 1.34 per cent., 1.10 per cent., and 2.10 per cent. respectively. This would show that there is no important difference in the amount of moisture and fat in baker's bread and that ordinarily made in families. The 'logwood solution' was used in testing for alum. This, though criticised, never failed to show alum when it was known to be present; and it is so delicate that it will show the presence of less than one part in ten thousand of crystallized alum in bread, and will do this even after the bread has been baked a month, and has become covered with mould. This was proved by the following ex-

periment: samples of pure flour that had been tested were mixed with known amounts of alum, and baked in the ordinary way, taking care that no alum was introduced. The test worked very satisfactorily, both upon the samples of flour thus prepared and the bread which had been made from them.

THE DELANCEY FEVER HOSPITAL.

The Annual Report of the Delancey Fever Hospital, Cheltenham, for 1881, is instructive reading, not so much from the number of cases treated, which was small, as on account of the excellent arrangements which it shows exist in the town for the prompt isolation of cases of infectious disease. During the past eight years, small-pox has broken out on fifteen separate occasions, but has in no instance spread beyond the family first attacked, results due, as the Report says, to the hearty co-operation of the medical practitioners of the town with the Health Officers of Cheltenham and the neighbouring Local Boards. During the year, two cases of small-pox and fifty-four cases of scarlet fever were treated in the hospital. Twenty-three of the scarlet fever patients were treated in private wards and thirty-one in the public wards. It is highly satisfactory to see the private wards so largely taken advantage of, and it will be a matter for surprise if the proprietors of the schools in the town do not at once recognise the value of an institution such as this for the isolation of cases of infectious disease which may arise among their scholars, by giving the hospital a hearty and generous support. We regret to note that two of the neighbouring Local Boards, though ready to use the hospital, decline to contribute in any way towards its support.

ABATEMENT OF THE SMOKE NUISANCE IN CINCINNATI.

We learn from the *Sanitarian* that the ordinance prohibiting the further defilement of the air of Cincinnati with smoke came into effect with the new year (SANITARY RECORD, February 15, p. 356), and vigorous measures have been taken to secure its enforcement. It is very gratifying to learn that the manufacturers, the chief offenders against the regulation, are themselves now found willing, and even pleased, to promote this great and salutary reform. According to the report of the official inspector, 'they all mean what is right', and 'seem anxious to know what smoke-consumers to get'. 'In every instance,' the inspector reports, 'he has been met in the kindest manner' by those upon whom he called to give notice of the enforcement of the law, and he believes that, 'everybody being interested in having the nuisance of soot abated, will do his best to that end, and the result will prove satisfactory to all concerned'. Our esteemed contemporary remarks that this good feeling is believed to be due to the tact of the inspector himself, and also chiefly to the admirable public spirit which pervades Cincinnati, and takes precedence in the minds of her citizens in the aggregate over the selfish interests so common to the people of most other American cities. In this respect our Transatlantic brethren set us a good example. It is indeed to be desired that manufacturers, and, in fact, citizens generally, would show a similar public spirit here, and so second the efforts which have been made for the abatement of smoke in our English cities by the joint committees of the National Health and Kyrle Societies.

INFANTILE MORTALITY.

Mr. Partridge of Stroud reports, in his Annual Report to his Sanitary Authority, a death-rate among children under one year of 13.9 per cent. of the total births, and 19.3 per cent. of the total deaths. Diarrhœa, debility, and convulsions appear to be the chief causes of death among infants; nearly all, Mr. Partridge believes, induced by bad food and general neglect. He goes on to point out that among the working classes, where the mothers leave home for work early, and return late in the evening, the children are 'placed out to nurse. The sopped, heavy bread and sugar, or milk, kept in unclean bottles, or until it is sour, soon causes irritability of the mucous membrane, leading to one of the above diseases. He states that he has often seen infants of a few months and upwards standing crying, spoon in hand, before their sour mess of fermenting stuff, loathing and rejecting it until the grandame has added more sugar to tempt the unpalatable stuff down. Healthy infants, without care, soon degenerate; large heads, large joints, bow legs, and flabby flesh result, and when dentition comes, it excites head or stomach symptoms in a system already in an abnormal state. Mr. Partridge's own experience, therefore, leads him to consider the unwholesome food, the frequent use of so-called cordials, and the bad system of clothing children in this climate by leaving the bodies exposed from the hips downwards, to be the principal factors, rendering them more subject to stomach and head affections. Alternations of temperature in the summer, in Mr. Partridge's opinion, have not so much influence on young children as on older persons.

FIRE-RISK FROM ELECTRIC LIGHTING.

The Boston Manufacturers Mutual Fire Insurance Company has issued a special circular for the use of its members, containing certain 'regulations for the use of electric light apparatus', which are endorsed by the Weston, the Brush, and the Edison Electric Light Companies. The substance of these regulations is as follows:—'The dynamo machines should be located in dry places, and not exposed to easily combustible material. They should be insulated upon wood foundations, and provided with suitable arrangements for controlling any changes in the quantity of the current. Complete wire circuits are insisted upon, the use of ground circuits being prohibited. To insure the insulation of the system, it should be tested daily before lighting. As arcs are formed in changing the ordinary sliding switch, the preference is given to that with a lapping connection, and where the former is used the switch board should be of some incombustible material. The conducting wires should be of sufficient size to prevent heating; they should have a water-proof insulation, and where they pass through walls, etc., should be protected with lead, hard rubber, or other suitable material. The wires should be placed at least one foot apart, and to avoid the accumulation of lint they should be from one-eighth to one-quarter of an inch from the wall. A cut-out should be placed in the circuit outside of each building. With regard to arc lamps, each one should be provided with a separate hand-switch, and also with an automatic switch for closing the circuit, if at any time any unusual resistance is offered in the lamp. Each light should have a globe, to be protected by wire netting when near combustible material. The globe should rest on a tight

revent the falling of melted copper or on; and it should also be protected at uch a manner, as not to allow of the con- rc with combustible substances. In case it lamps are employed, all the wires must ly insulated, and each building should be th an automatic switch to provide against

:-VENTILATED SMALL-POX HOSPITAL.

er on 'How to combat Small-pox', read tate Sanitary Convention at Ann Arbour,). W. Wight proposed a new plan for the of hospitals for the isolation of persons m small-pox and other infectious diseases. , to construct around a central octagon octagons of the same dimensions as the , and to fill in the intervening spaces, so our squares. If the length of the side of be taken, as he suggests, as twelve feet, then be formed round the central octagon ial wards, each with a diameter of about and containing a space of about 10,000 nd four small square rooms, which he use as isolation wards, each of which ose a space of about 2,000 cubic feet. f the four external octagonal rooms Dr. d put five patients, and into each of the ards one patient, thus giving to each o cubic feet of air space. The central would divide into four large bathrooms ary accessories. The ventilation, the oses to effect, 'by an iron pipe running ntre of the ceiling up through the roof, in id of which a flame of gas or of some ial may be kept constantly burning. A going up from the centre of the ceiling on would cause an entire change of air n every forty minutes', and would thus patient 3,000 cubic feet of fresh air per -inch pipe would do the same service for small square rooms.' This method of would have the further advantage, its author, of destroying the contagion f the infected rooms. 'The contagious l be reduced to a harmless state as fast as om the patients'. Dr. Wight claims for onstructed after this fashion many minor These, however, can be attained by ds of construction. On the other hand, ital presents serious disadvantages. The o closely connected, and altogether the o to speak, too concentrated. Hospitals us diseases should have their wards art from one another; the wards should stitute separate hospitals. There is, we ecial reason why each ward should take an octagon, but the plan of 'flame-venti- l prove a useful addition to the ordinary ntilation.

ITARY MATTERS IN COVENTRY.

of some simple practical instruction to nt mothers in the management of their ikingly exemplified in the last Report of Fenton, Medical Officer of Health for his Authority. He notes a very large in the fatality in infants under one year, as against a serious increase in 1880. f his investigations into this satisfactory discrepancy induces him to attribute a great deal of this mortality to sheer ignorance on the part of the mothers with respect to the feeding and care of their babies. In order in some degree to instruct them in their maternal duties, a printed bill, giving much valuable information in reference to the care and management of infants, has been given to every mother, with, Dr. Fenton thinks, the happy result of a considerable saving of life amongst the Coventry babies. Dr. Fenton also reports a considerable decrease in the death-rate and the loss of life from zymotic disease since the appointment of the Sanitary Committee, and consequently the more rigorous administration of the Public Health Act. The death-rate for five years ending 1876 was 22.0 per 1000, which fell in 1881 to 19.8. The deaths from zymotic disease in the first period amounted to 805, and in the second to 518 only. In reference to the spread of epidemic diseases, Dr. Fenton comments on the advantages of the establishment of an hospital for isolating infected persons, of a disinfecting chamber, and the appointment of an officer specially to carry out these provisions. The result is a reduction of 7.0 per 1000 in the death-rate, representing a saving of nearly 300 lives annually.

DRAWN OR UNDRAWN POULTRY.

The question whether poultry and game should be 'drawn' or not, when prepared for market, has been receiving public attention in America, and there is likely to be some legislative action taken about it. It is the prevalent custom in that country now, to sell poultry 'undrawn'. The highest prices are generally paid for fowls thus prepared—or unprepared. Even those sent from the West often come to market in this condition, and it is the belief of some that the flesh keeps longer so. The opening of the body and exposure of the interior to air, offers naturally an opportunity for putrefactive changes. At the same time, the presence of undigested food and of excrementitious substances in the animal would seem to favour decomposition. It is well known that the viscera are the first parts to become putrid, and the continual osmosis cannot but carry some of the putrid juices to neighbouring tissues. There seem to be no definite facts as to which will keep longer under various conditions, the drawn or undrawn fowl. The ordinary laws regarding putrefactive changes, however, certainly lead to the opinion, that the removal of the viscera, with their contents, would be much the more certain way of ensuring the freshness of the tissues. There would be no question at all as to the advisability of this procedure, if the abdominal cavity were carefully dried and the incision sewed up. The American Hotel-Keepers' Association, it appears, in discussing this subject, came to a similar conclusion—that poultry should be drawn—and a bill to enforce such a procedure is to be presented to the State Legislature.

DETECTION OF OLEOMARGARINE.

A process of detecting oleomargarine has been proposed by Messrs. Leune and Harburet. In a communication on this subject to the American Chemical Society by P. Casamajor, the specific gravity of butter is 0.926, which would remain in equilibrium in dilute alcohol of 53.7 per cent., at 15° C. Oleomargarine requiring alcohol of 59.2 per cent. to hold it suspended in the spherical state, the question of the possibility of distinguishing butter from oleomargarine becomes equivalent to the pos-

sibility of distinguishing between alcohol of different densities, which may be readily determined, the above difference being represented by 5.5 of Gay-Lussac's alcoholometer. Variations between the two densities are produced by commercial mixtures of oleomargarine and butter: so that several degrees of dilution between the two extremes given above are required in performing this test in the laboratory. As a rule, alcohol of 55 per cent. (and at 15° C.) should be commonly used; and any sample which will not sink to the bottom should be considered oleomargarine. The details of the manipulation are given in an abstract of this paper, published in the *Druggists' Circular and Chemical Gazette* for March 1882. The proportions of butter and oleomargarine in a mixture may be also determined without the aid of an alcoholometer, by using the two solutions of 53.7 per cent. and 59.2 per cent. These may be placed in graduated glasses and poured cautiously into a third glass, until an alcohol of sufficient strength is obtained to keep a globule of the fat under examination at 15° C. The relative volumes of the two solutions used in making the mixture give the proportions of butter and oleomargarine.

THE PRESERVATION OF ANIMAL VACCINE.

The principal obstacle to the general adoption of calf lymph in vaccination has, hitherto, been the difficulty of preserving it. Used in the fresh state, it gives results thoroughly satisfactory, but 'it has the disadvantage of not keeping well, and after twenty-four hours the prospect of successful vaccination from any sample becomes more and more hypothetical'. This disadvantage Reissner, of Darmstadt, claims to have succeeded in obviating by a special method of preparation of the lymph. His method of procedure is as follows:—The pustules of the calf, five days (of 24 hours each) after inoculation, were scraped off or cut out, and then dried for two days in an exsiccator over sulphuric acid; they were then ground in a mortar, and the resulting powder was preserved over sulphuric acid. Directly before use, this powder was made into a paste of the consistence of jelly (dickflüssigen Brei) by mixture with water or diluted glycerine, and this paste was rubbed into the incision. With calf lymph preserved in this way, Reissner declares he has had very successful results. Out of 212 primary vaccinations in which it was employed, the operation was successful in no less than 209, or in a percentage of 98.6 (ca.), while in re-vaccination he obtained a successful result in 89.5 per cent. of the cases operated on. This success, he declares superior, in both primary vaccination and re-vaccination, to that obtained at the Hamburg Vaccine Institute, where fresh calf lymph was employed. If this method prove really as successful as its author claims it to be, one of the greatest difficulties in the way of the general use of animal vaccine will have been overcome. All that would then be required in this country would be a few large central farms under Government control, for the cultivation of the supply, which could be thus preserved and readily distributed over the country.

THE NOTIFICATION AND ISOLATION OF INFECTIOUS DISEASE.

The consensus of opinion amongst Medical Officers of Health, in favour of the isolation and notification of cases of infectious disease, seems to be getting stronger and stronger. As practical workers amongst the classes whose dwellings are crowded and overcrowded, it must be owned that their experience is of a valuable character. Mr. Hollinshead, the Medical Officer of Health for the King's Norton Union, remarks, in his Report for 1881, of the sanitary condition of his district, that, to quote his own words, 'the only effectual way of stopping the spread of infectious diseases is by "isolation". This can be done among the well-to-do class of people to a considerable extent, but among the poor, where probably the extent of their bedroom accommodation is only two rooms, it is simply impossible; and I am convinced from my observations, that many cases spread through this imperfect "isolation", and I am, moreover satisfied that my efforts will fall far short of what I could wish, so long as there is no proper provision made for that purpose in the nature of a fever hospital.' He then proceeds to point out the necessity of all cases of infectious disease being communicated to him early, up to the present time his only means of obtaining information having been by the fortnightly sheets of the District Medical Officers. His Authority, however, have now given him the means of obtaining the information, by allowing a small fee to the medical men who send immediate information of any case coming under their care. Mr. Hollinshead has not had time to test the results at present, but is quite satisfied that the consequent advantages will be great.

Mr. M. A. Adams, the Medical Officer of Health for the Borough of Maidstone, in his Annual Report for 1881, very wisely impresses on his readers that 'an isolation hospital is no more a charitable institution than the Town Hall or the Town Pump; it is an example of one of the most recents efforts of civilisation, whereby a community secures for its citizens collectively, a comfort, resource, and protection which individually a citizen could hardly provide for himself, he is specially solicitous that there should be a clear understanding on the part of the public that the use of an isolation hospital implies no sacrifice of independence or dignity, neither is it intended for any one class.

Dr. Elliott of Carlisle also reports to his Authority that scarlet fever (*alias* scarlatina) has ror some time been, and still is, present as an epidemic in his district. Notwithstanding its very general concealment, 175 cases of this disease were reported; of these, 73 were removed to the Fever Hospital; only two of which ended fatally — both were late admissions from very objectionable quarters, but speedily removed after discovery. Of the 102 not removed (for various reasons), although tracked out, 29 died at home! The reasonable probability is that, had the 73 been kept at their miserable homes, instead of being removed to the hospital, a higher number would probably have died; and had the 102 kept at home been allowed to go to the hospital, the death register would have presented a very much smaller number than 29. Dr. Elliott goes on to remark, in his forcible way, 'What an urgent claim do such averments make on the Legislature in support of "compulsory notification of infectious diseases", at once so powerfully aiding the recovery of invalids, and effectively protecting the uninfected from the ravages of an epidemic; and how unworthy does opposition, or even indifference, to compulsory notification, appear, when the whole question at issue is that of removal to an airy and cheerful hospital, as against seclusion in a dingy close room, which it is practically im-

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ration in 1879, and, up to the present date, upwards of 11,650 intimations have been received; and already the amount paid to the profession is £1,460. During 1881 there were 3,206 intimations received from 155 medical men—the numbers sent in by each varying from 1 to 170. Before promoting their Bill in Parliament, the Corporation consulted the various medical bodies in the city, including the Royal Colleges of Physicians and Surgeons. Without an exception, the profession expressed their disapproval of a compulsory clause, and the Colleges threatened to oppose the Bill as it passed into Committee. By inadvertence, no opposition was offered, and the clause in question became law in November 1879. Since then the medical profession here have loyally sent in their intimations and given the clause a fair trial. No complaint of any kind has reached the authorities from either medical attendant or patient. Public opinion in the modern Athens is entirely in favour of the clause and the citizens have never objected to the system of notification. Mr. Clark thinks, the benefits conferred by it on the community at large are so obvious, as at once to disarm opposition. First, the Local Authority can thereby accurately gauge, day by day, the health of the community, and effective measures can at once be taken to meet any increase of disease. Secondly, epidemic disease can thus alone be effectually stamped out. To his knowledge three, if not more, distinct outbreaks of small-pox have lately been arrested by rapid isolation of the first reported cases in a hospital. Thirdly, by this system of notification the medical profession are reminded by each case that is reported, of the duty they owe to the public in securing the suitable isolation of the patient, and the disinfection of his apartment and his clothing. The Corporation of Edinburgh have, it appears, unanimously petitioned in favour of Mr. Hastings's Bill, as they are convinced that some such measure, laying the responsibility of notification on the medical attendant, is absolutely necessary to preserve great centres of population from the ravages of epidemics, and, in the case of Edinburgh, to maintain its character as a salubrious residence.

Mr. Lee F. Cogan, Medical Officer of Health for Northampton, in his report to his Authority, thus gives his opinion on the question. 'At present, it is acknowledged that, those engaged in the practice of preventive medicine, are afforded but little assistance at the hands of the public, in combating with infectious diseases; in fact, there is rather an inclination to withhold from sanitary officials information of the occurrence of such diseases. It is evident that early information of the presence of preventible diseases is of incalculable advantage to those who are responsible for undertaking precautionary proceedings for limiting the extension of infection. But I think the successful working of an Act of Parliament (which is proposed), rendering the notification of infectious disorders to Sanitary Authorities compulsory, would be sensibly frustrated unless at the same time provision is made for the hospital treatment of these diseases. It is important that for successfully dealing with contagious affections, means must be available for permitting complete isolation of the infected from the non-infected; now this, even in the houses of the well to do, is oftentimes most difficult of accomplishment, and in the homes of the working-classes such a proceeding is utterly impracticable; and consequently, disease, when once it breaks out, is distributed widely. Not only is it necessary to have knowledge of the existence of diseases, but in order

that their dissemination may be checked, proper measures must be at hand and applied for preventing this. To treat scarlet fever and other intensely contagious maladies, with a hope of successfully checking their spreading in the majority of the houses in this town, is, altogether, almost a hopeless task. It appears to me that it is only right that if, by legal enactments, it is rendered obligatory on the part of the public to inform Sanitary Authorities of the occurrence of infectious diseases, so also should it be demanded of these bodies to provide institutions for their treatment. Every town which has not at its disposal an establishment for the reception of its infectious sick, certainly labours under considerable disadvantages compared with places that are so provided.'

THE PUBLIC HEALTH

DURING MARCH 1882.

THE mean temperature of the air at the Royal Observatory, Greenwich was 46°.0, during March; it was higher than the mean temperature in the corresponding month of any year since 1859, and exceeded the average March temperature during 100 years by no less than 5°.1. The mean temperature of the first three months of this year averaged 42°.7, and was 4°.1 above the 100 years' average. Excepting on five days (3rd, 4th, 22nd, 23rd, and 26th), the mean temperature showed a considerable excess throughout the month. The lowest mean temperature of any day in the month was 37°.9 on 4th, while the warmest days were 8th and 9th, on each of which the mean was 50°.6, and 10° above the average. Rain was measured at Greenwich on eleven of the thirty-one days during last month, and the aggregate amount of the fall was only 1.1 inches, which was half an inch below the average March rainfall during sixty-one years. The rainfall in the first quarter of this year was only 3.6 inches, which was 2.4 inches below the average rainfall for the quarter. The sun was above the horizon during 366.9 hours during last month, and 127.9 hours of bright sunshine were recorded at Greenwich. The average amount of bright sunshine recorded during the corresponding month of the five years, 1877-81, was 104.2 hours, or 23.7 hours less than that recorded last month. The amount of sunshine in the first three months of this year differed but slightly from that recorded in the corresponding quarter of last year. South-westerly winds prevailed during the greater part of March.

In twenty-eight of the largest English towns, now dealt with in the Registrar-General's weekly return, having an estimated population of nearly eight millions and a half of persons, 29,502 births and 19,170 deaths were registered during the five weeks ending 1st inst. The births were equal to an annual rate of 36.4 per 1,000 of the aggregate population of these twenty-eight towns. The birth-rate in these towns was considerably below that recorded during March 1881 in the twenty towns then dealt with in the weekly returns. The lowest birth-rates in the twenty-eight towns last month were 29.2 in Brighton and 31.7 in Plymouth. The rates in the other towns ranged upwards to 41.5 in Birmingham and 41.9 in Nottingham. The birth-rate was equal to 37.7 in London, whereas it averaged 37.4 in the twenty-seven provincial towns.

The annual death-rate in the twenty-eight towns during the five weeks of March averaged 23.7 per 1,000, and a decline of 2.9 from the high rate prevailing in the preceding month. The average death-rate in the twenty towns formerly dealt with was equal to 23.6, against 22.4 and 22.0 in the corresponding months of 1880 and 1881. The lowest rate of mortality in these towns during last month was 19.2 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Hull, 19.3; Birkenhead, 19.7; Birmingham, 20.1; Huddersfield, 20.4; Leicester, 20.7; Cardiff, 21.1; Salford and Newcastle-upon-Tyne, each, 21.8; Leeds, 21.9; Bristol and Derby, each, 22.5; Plymouth, 22.7; Sheffield and Bradford, each, 23.0; Sunderland, 23.2; London and Halifax, each, 23.5; Wolverhampton, 25.4; Norwich, 25.5; Liverpool, 25.7; Bolton, 26.4; Nottingham, 26.8; Oldham, 27.0; Brighton, 27.5; Preston, 28.5; Manchester, 30.0; and, the highest rate during the month, 31.3 in Blackburn. The death-rate was equal to 23.5 in London and 23.8 in the twenty-seven provincial towns, which have an aggregate population somewhat exceeding that of London. It is worthy of note that six of the eight towns appearing at the bottom of this list are Lancashire towns; Bolton, Preston, and Blackburn being among the eight towns recently added to the Registrar-General's list.

The 19,170 deaths from all causes in the twenty-eight towns during the five weeks of March included 1,167 which were referred to whooping-cough, 794 to measles, 376 to scarlet fever, 273 to 'fever', principally enteric, 225 to diarrhœa, 153 to diphtheria, and 91 to small-pox. In all, 3,079, or 16 per cent. of the total deaths, resulted from these principal zymotic diseases. These zymotic deaths were equal to an annual rate of 3.8 per 1,000 in the twenty-eight towns, and showed a slight decline from the rate that prevailed in the preceding month. The zymotic death-rate last month was equal to 4.1 per 1,000 in London, and averaged 3.5 in the twenty-seven provincial towns. It ranged in these provincial towns from 1.2 in Birkenhead, and 1.7 in Sheffield and Halifax, to 5.5 in Nottingham, 5.9 in Preston, 6.5 in Bolton, 7.2 in Brighton, and 7.9 in Blackburn. Excessive measles fatality was the main cause of the high zymotic death-rate in each of the four last-mentioned towns, while scarlet fever was fatally prevalent in Nottingham.

Whooping-cough was, as it had been in each of the three preceding months, by far the most fatal zymotic disease in these large English towns. The annual death-rate from this disease, however, which had steadily increased in the five preceding months from 0.38 to 1.78, declined to 1.44 during March. In the corresponding month of 1881, the death-rate from whooping-cough in the twenty towns then dealt with did not exceed 0.51. The fatality of whooping-cough again last month considerably exceeded that which prevailed in the provincial towns. The highest death-rates from this disease were 2.3 in London and Brighton, 1.4 in Bristol, 1.3 in Manchester, and 1.2 in Salford. The death-rate from measles in the twenty-eight towns averaged 0.98 per 1,000, and showed an increase upon the rate that prevailed in each of the two preceding months. It was more than three times the rate due to this disease in March 1881, when it did not exceed 0.30. The highest death-rates from measles last month were 6.1 in Blackburn, 4.1 in Bolton and Preston, 3.8 in Norwich, and 3.7 in Brighton. The rate of mortality from scarlet fever did not exceed 0.46, and showed a further decline from the rates prevailing in recent months. The average rate in the provincial towns was more than twice as high as that which prevailed in London. The highest death-rates from scarlet fever in the provincial towns during March were 1.6 in Sunderland, 2.6 in Nottingham, and 2.8 in Hull; 42 more fatal cases of this disease were recorded in Hull during last month, raising the number that has occurred within the borough since the 1st July last to 782. 'Fever', principally enteric, caused 273 deaths in the twenty-eight towns during last month, of which 130 occurred in London, and 143 in the twenty-seven provincial towns. The mean death-rate from fever averaged 0.34 in the twenty-eight towns, and exceeded the rates prevailing in recent months. The largest proportional fever fatality during March was recorded in Liverpool, Blackburn, and Nottingham. The fatality of diphtheria in these large towns continues to show a marked excess. The death-rate from this disease was equal to 0.19 per 1,000, whereas in the corresponding month of last year it did not exceed 0.10. The 153 deaths from diphtheria in the twenty-eight towns included 90 in London, 19 in Portsmouth, 7 in Birmingham, 6 in Liverpool, and 5 both in Manchester and Cardiff. The epidemic of diphtheria in Portsmouth, which broke out in the latter

, continues to prevail; the death-rate from which averaged 1.7 per 1,000 within the ughout last year, averaged 2.2 during the first of this year, and was equal to 1.5 in March. re weeks of March, 91 deaths from small-pox d in these twenty-eight towns, equal to a rate ring a further slight decline from the rates in recent months. Of these 91 deaths, no occurred in London; of the remaining 19, ed in Nottingham, 4 in Bolton, 3 in Man- 3 in Leeds. Judged by the returns of the Asylums Hospitals, the prevalence of small- lon continues to decline. The number of ients under treatment in these hospitals, which and 436 on the last Saturdays in January and ectively, had further declined to 367 at the . The average weekly number of new cases ese hospitals, which had been 84 and 79 in February, further fell to 58 during the five rch. The proportional fatality of small-pox olis was again largest in the south and east stration districts during March.

infant mortality, measured by the proportion ler one year to births registered, averaged 155 the twenty-eight towns during March, id 165 in the first two months of this year. on of infant mortality was equal to 154 in e it averaged 157 in the twenty-seven pro- , and ranged from 100 both in Hull and 6 in Brighton, 198 in Halifax, 203 in Preston, , and 239 in Blackburn. The high rate of ty in each of these last-mentioned towns, ex- was due to the great fatality of measles.

rate from diseases of the respiratory organs, he Metropolitan returns, showed a marked March from the high rate in the preceding average weekly number of deaths referred es in London, which had steadily increased eding months from 159 to 739 in February, n to 435 in March. This number was 60 rected weekly average in the corresponding last ten years. The annual death-rate from in the Metropolis, which had steadily in- six preceding months from 2.2 to 9.9 per d to 5.8 in March. The annual death-rate eases during last month was equal to 6.1 in l 4.5 in Salford.

five weeks of March, the causes of 461 twenty-eight towns were not certified either ed medical practitioner or by a coroner. ied deaths were equal to 2.4 per cent. of the registered, and showed a slight increase upon prevailing in the preceding month. The uncertified deaths did not exceed 1.3 in eas it averaged 3.3 in the twenty-seven pro- . The smallest proportions of uncertified h were 0.4 and 0.6 per cent. in Portsmouth The proportion ranged upwards in the other o in Salford, 7,1 in Hull, and 7.8 in

population, consisting of little less than a is, estimated to be living in the outer ring of ricts round London, the annual death-rate s during March was equal to 19.2 per 1,000, elow the rate that prevailed in the previous annual death-rate from the principal zymotic se suburban districts was equal to 2.8 per g a further increase upon the rates in recent ing the five weeks of March, 14 fatal cases were recorded in the outer ring, of which 8 West Ham. Measles and whooping-cough sed prevalence around London during March, 4 and 113 deaths respectively in the outer

SPECIAL REPORTS.

THE SANITARY ASSURANCE ASSOCIATION.

The first annual meeting of the members of the Sanitary Assurance Association has been held at the offices of the Society, 5, Argyll Place, Regent Street, W. Professor Hayter Lewis, Vice-President of the Royal Institute of British Architects, presided.

The Secretary, Mr. Joseph Hadley, read the annual report and balance sheet of the Association, the first incorporated institution in the country for the purpose of sanitary assurance. The Association was founded in November 1880, but did not commence the inspection of houses, supervision of sanitary work, and issue of plans and certificates as to the sanitary condition of houses until April last year. The houses inspected during 1881 varied in rateable value from £36 to £750. The work of the year had involved an expenditure of £365, including outstanding liabilities, and the balance in hand at the close of 1881 was £2 6s. 11d.

Professor Hayter Lewis, in proposing the adoption of the report and balance sheet, referred to the great public importance of the work the association had initiated in the Metropolis. There was, however, a good deal of work to be done before the public would fully appreciate the necessity for sanitary inspections. An admirable illustration of the unreasoning attitude that is assumed, even by educated men, towards this question occurred in the office of the association in the following dialogue between the secretary and the visitor. The visitor, a solicitor, appeared to be in a very distressed state of mind, and anxiously inquired whether the association was in actual operation, and being answered in the affirmative, he said that he had written to his landlord (who was abroad) about the condition of his house, but wanted an inspection of it made at once, seeing that not only was his son ill of typhoid fever, but 'a dear daughter' had also that morning been attacked apparently by the same disease, and 'I have two other daughters at home, and their mother is absent'. *Secretary* (on hearing previous details): 'Have you any bad smells at your house?' *Solicitor:* 'Yes, at times; how soon could an inspection be made?' *Secretary:* 'The first thing to-morrow morning, as it is an urgent case'. *Solicitor:* Very well, please take down the particulars, my feeling is to leave the house at once if there is anything wrong.' *Secretary* (after filling up form from solicitor's dictation): 'The entrance fee is 10s. 6d., one year's subscription, 10s. 6d., and fee for inspection, report, specification, supervision of any work that may be necessary, and certificate. 42s. (the house being rated above £60)—together £3 3s.' *Solicitor:* 'Do you mean to say that you ask me to pay £3 3s.' *Secretary:* 'That is so.' *Solicitor:* 'Exigeant! too much!' The Secretary having expressed his surprise that in return for an inspection, report, etc., made both by a well-known physician and professor of hygiene, and a surveyor experienced in sanitary matters, a fee of £3 3s. should be considered too much in a case of such emergency, the interview terminated without the inspection being ordered.

Professor de Chaumont, F.R.S., of the Army Medical School, Netley, said he thought the result of their first year's operations was such as to augur well for the future.

Mr. T. Roger Smith, Professor of Architecture, said that he could testify to the thoroughness with which the officers of the Association did their work, as he had himself sought the advice of the Association in connection with the sanitary arrangements of a public building he had to erect, and had found the help of the Association most useful.

The report and balance sheet were unanimously passed.

On the motion of Professor de Chaumont, seconded by Professor Corfield, the retiring members of the Council were re-elected, and Mr. R. G. M. Creasey was appointed auditor.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on Friday, March 17th, Dr. J. W. Tripe, President, in the chair.

Dr. G. H. Percival, Medical Officer of Health Northampton and Hardingston Rural Sanitary Districts was elected an extra-Metropolitan member of the Society.

Attention was called by Dr. BROWNING to the fact that a meeting of the Social Science Association would be shortly held, at which a discussion would take place on the Bills before Parliament for the notification of infectious diseases, and it was resolved to send a copy of the Society's resolutions on this subject to the various members of Parliament whose names were to be found on the backs of the Bills.

On the motion of Dr. DUDFIELD and Mr. LOVETT, it was resolved that the Council should be requested to consider the alterations in the classification of diseases in the Registrar-General's weekly returns, with a view to ascertaining whether they would affect the tables recommended by the Society of Medical Officers of Health; and that the Secretaries should ascertain whether these alterations will be made in the annual report as well as in the annual summary.

THE NECESSITY FOR AN ALTERATION IN THE LAWS RESPECTING RE-VACCINATION.—Dr. TRIPE read a Paper on this subject, which will be found at page 404.

Dr. BRISTOWE agreed with the author that much of the vaccination of infants, as at present performed, could not be trusted to protect them against small-pox during the first twelve or fourteen years of their life, and that in houses where small-pox occurred, the age limitation for payment should be lower than it is at present.

Dr. CORNER noted the unsatisfactory way in which vaccination was performed, and thought even ten years would not be found low enough as the age for re-vaccination of many children.

Dr. MOORE gave an account of an outbreak of small-pox, in which vaccinated children of two or three years of age contracted small-pox, but he thought that the parents, rather than the vaccinators, were responsible for the unsatisfactory performance of the operation, by limiting the number of insertions. He thought the age limitation for payment of re-vaccination should be much below ten years.

Mr. SHIRLEY MURPHY agreed that primary vaccination in infancy did not, in many instances, protect until twelve or fourteen years of age, but thought difficulties would arise if the age limitation for payment were much reduced, as it would necessitate a recognition of the principle, that charge might be made for re-vaccination again and again. In houses where small-pox occurred, there was, however, a special reason for the removal of the age restriction.

Dr. BROWNING thought that, with a view to ensure that vaccination was done in the best way, the operator should not be permitted to certify to his own vaccination.

Dr. TRIPE briefly replied to the observations made upon his Paper, and dwelt upon the reasons which had influenced him in not recommending that the age limitation for payment for re-vaccination should be below ten or twelve years.

A vote of thanks was then unanimously accorded to Dr. Tripe, upon the motion of Mr. WYNTER BLYTH.

THE POSITION OF LEGISLATION CONCERNING METROPOLITAN BAKEHOUSES.

Mr. SHIRLEY MURPHY made some observations on this subject. The Bakehouse Regulation Act, 1863, was repealed by the Factory and Workshops Act, 1878, which came into operation on January 1st, 1879. The Sections in the former Act relating to the proper cleaning and lime-whiting of the bakehouse, to its ventilation, and to the keeping of it free from effluvia arising from any drain, privy, etc., together with the prevention under limitation of the use, for sleeping purposes, of a room on the same floor as the bakehouse, are embodied in the latter Act. But the powers which Section 6 of the Bakehouse Act gives to the Health Officer and the Inspector of Nuisances to enter the bakehouse at all times during the hours of baking, for the purpose of inspection, have not been incorporated in the Factory and Workshops Act, and therefore the Sanitary Authority now has no more concern with bakehouses than with any ordinary dwelling-house in their district. The duty of inspecting bakehouses, as such, has now devolved upon the factory and workshops inspector. Section 4 of the recent Act provides that a factory inspector shall give notice to the Sanitary Authority of any 'nuisance' which he may find to exist in the bakehouse, and it then becomes the duty of the Sanitary Authority to take proceedings, but it will be seen that, although this Authority may still be used for the purpose of remedying an evil which already exists, their influence in preventing the occurrence of any nuisance, an influence which alone can come from constant inspections, has ceased.

Mr. Murphy had brought this subject before the Society with a view to eliciting an opinion of how far the existing arrangements for the inspection of bakehouses fulfilled the conditions required, not only to keep the inmates of the bakehouse in good health, but to prevent the distribution to the public of bread made under conditions not conducive to the public health.

But recently the duties relating to the prevention of disease produced by the distribution of infected milk had been made to devolve upon a body which had not even the advantage of medical aid in the performance of this responsible office. It is a matter for regret, that the medical aspect of matters so intimately related to the public health as the distribution of a food supply, is being lost sight of by the legislature. So far as his own district was concerned, he could find no evidence that more than 37 per cent. of the bakehouses had been visited by the factory inspectors since the last Act came into force. He was led to doubt whether the inspection of bakehouses could be as well carried out by a central authority, with the very few inspectors at their command, as by the local authorities; who, although they had not so large a staff as might be considered desirable, yet had the advantage, which he considered most important, that the inspection was under the supervision of the Medical Officer of Health.

Mr. LOVETT argued that, inasmuch as the Factory and Workshops Act repealed the following words in the 19th Section of the Sanitary Act, 1866, 'not already under the operation of any general Act for the regulation of factories or bakehouses', the Sanitary Authority was left to deal with any factory, workshop, or workplace not kept in a cleanly state, etc. He had been in communication with Mr. Redgrave, Chief Factory Inspector, who held that, inasmuch as Section 101 of the Factory and Workshops Act stated that the provisions of Section 91 of the Public Health Act, 1875, should not apply to a factory or workshop which is subject to the provisions of this Act relating to cleanliness, ventilation, and overcrowding, the Local Sanitary Authority had no special jurisdiction over bakehouses. Mr. Lovett felt that Mr. Redgrave's reasoning was true so far as those Sanitary Authorities and bakehouses which are controlled by the Public Health Act, 1875, are concerned, but seeing that this Act has no jurisdiction in the Metropolis, the Metropolitan Sanitary Authorities may still, working under the 19th Section of the Sanitary Act, 1866, claim jurisdiction over any bakehouse not kept in a cleanly state, etc., the repeal of the words he had stated in the 19th Section of the Sanitary Act compensating for the repeal of the Bakehouse Regulation Act. He believed the factory inspectors had not visited bakehouses in his district.

Mr. WYNTER BLYTH felt strongly that bakehouses should be under the supervision of the Medical Officer of Health. He had distilled from bread made in an unclean way butyric acid, which must be very unwholesome to those who eat such bread. Probably, if no action were taken, the matter might slumber until some serious outbreak of disease called attention to the necessity of a more thorough inspection of bakehouses.

Dr. CORNER said that the bakehouses in his district had not been inspected by factory inspectors, and the dirty habits of many London bakers made a frequent inspection very necessary.

Dr. BROWNING stated that his own Authority had

l to deal with an offensive privy situated in a bake-
feeling that they had no authority to do so.

BRISTOWE agreed with the view that bakehouses l be under the supervision of the Medical Officer of h, and said that he believed the bakehouses in his t were not visited by the inspectors. He suggested he various Health Officers should, in the course of xt month, inspect the bakehouses in their districts, ıat the Society should then take any step that should lesirable.

TRIPE said that the bakehouses in Hackney were ıspected by the Sanitary Authority, as the legal ques-ad not yet been raised there, but he feared there was ubt about the intention of legislature in the matter.

MURPHY, in reply, read from a newspaper a para-stating that the bakers in Clerkenwell had ob-to the interference of the local Sanitary Inspector, correspondence had taken place with the Home with the result that an opinion was expressed by ffice, that the Sanitary Authority could only interfere their attention was directed to a nuisance in a bake-by the factory inspector.

PREVALENCE OF WHOOPING-COUGH.

CORNER called attention to the prevalence of ing-cough in the Metropolis. In the last ten weeks present year, 47 deaths had occurred in his district this disease. He raised the question whether it be well for the Sanitary Authorities to take pro-gs against those who wilfully exposed children suffer-ım this disease in public places.

WYNTER BLYTH thought it would be impossible to t children suffering from whooping-cough going out ɔrs. Such a step would tend to bring sanitary ne into bad odour.

BRISTOWE pointed out that the disease was often ɔgnisable until it had existed a fortnight, and could erefore, be dealt with as cases of other dangerous ɔus diseases.

TRIPE approved of a suggestion that had been made, etter should be sent to hospital authorities, cautioning gainst the treatment of such cases in the out-patient nent.

LOVETT thought these cases did not, as a rule, the out-patient room, but were attended at their ɔmes.

Society then adjourned.

RKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

ɛTING of the Yorkshire Association of Medical s of Health was held at the Town Hall, Bradford, ursday the 30th March. In the early part of the r. Butterfield, Medical Officer of Health for the h, kindly conducted the members then present over blic slaughterhouses; and to view the 'destructors', about 700 tons of ashes and household refuse are ıed weekly. A visit was also paid to the disinfecting tus (one of Ransome's), and to the Fever Hospital. ıssembling at the Town Hall, Mr. S. W. North, ɛnt, took the Chair, a considerable number of mem-d visitors being present.

BUTTERFIELD read the first paper on 'The Working lford of the Act for the Compulsory Notification of ɔus Diseases'. He stated that it was first intended for powers for the closing of shops where provisions, g, and other articles likely to retain infection, were henever, from the presence of infectious disease, such ıppeared necessary), and for the compulsory removal ons suffering from infectious diseases, not having lodging and accommodation enabling the case to be y isolated or treated. On account of opposition from lical profession these latter clauses were abandoned. seases, of which notification was required, were ox, cholera, typhus, typhoid fever, scarlet fever, ıa, and diphtheria. Relapsing fever was originally l, but afterwards omitted; scarlatina was inserted by some official in London. Measles and whooping cough were omitted for various practical considerations, although their importance was fully recognised. From the date of the Act coming into operation, until the end of December, 423 cases of scarlet fever were reported, of which 215 were admitted to the Fever Hospital, and 7 to the infectious wards of the Workhouse. In addition, 82 cases of enteric fever, 12 of diphtheria, and 2 of English cholera, making 525 cases reported by forty-nine practitioners. The fact that forty-nine medical men, out of sixty-six, reported cases, was a sufficient proof that this Act was accepted by the profession; and when they considered 106 cases of scarlet fever were sent to the Fever Hospital without the interven-tion of the Medical Officer of the borough, it became evi-dent that the medical profession were desirous of co-operating with the Corporation in the suppression of these dis-eases. Mr. Butterfield expressed himself as sanguine of the good results which would follow from the carrying out of the Act in the future; especially, he hoped that there would be a more perfect control over the spread of these diseases, by the more general enforcement of isolation and disinfec-tion, and the prevention of outbreaks of infection, due to local causes, such as defective drainage, or polluted milk-supply, which, without compulsory notification, would not be suspected until several deaths had taken place. Another point which is often overlooked, the effect of legislation to this end, viz., the education of the public in the avoidance of infection. Too much must not be expected from local Acts. Stamping out diseases, as the phrase ran, would only be possible when a general Act, to apply to the whole king-dom was enforced. It must be borne in mind that compul-sory notification was not a remedy; it was, in fact, only an instrument of more accurate diagnosis.

Dr. SCOTT, Ilkley, expressed his doubts as to the benefits to be expected from these local Acts, and his fear that people would not call in medical assistance, and the disease would then spread more rapidly than before. Dr. Mason stated that since last year 800 persons had died from scarlet fever in Hull. At least 9,000 children had suffered from the disease during that period. At the commencement of the epidemic they had no means of obtaining knowledge of infectious cases. He had more faith in the public being educated to see the value of precautionary measures than in compulsory Acts.—Mr. NORTH, President, York, was opposed to the compulsory clauses of local Acts, because he was yet unconvinced that they would answer the purpose in view. It ought to be remembered that, by statute law, no Medical Officer of Health had a right to enter a house except by special warrant.—Mr. BUTTERFIELD in reply claimed that, although compulsory notification would not stamp out disease, yet if they got 200 out of 400 cases isolated in the hospital, they prevented infection to 600 or 700.

Dr. HIME, Medical Officer of Health, Sheffield, read a very interesting paper on 'Meat-Poisoning', He referred to the large number of cases of meat-poisoning in this country and abroad, and the difficulty of these cases being thoroughly investigated, as long as the matter was left, as is usually the case, in the hands of the police and chemical analyst, without proper medical advice. In the absence of mineral poisons, the analyst, unfamiliar with the symptoms of such diseases as typhoid fever, cholera, etc., could only report that no poison he was acquainted with was present. The paper chiefly dealt with cases of poisoning by meat derived from animals suffering from certain infectious dis-eases, and to the remarkable cases in which meat became poisonous simply by being kept too long. In the case of sausage-poisoning the effects were stated to be due to special putrefactive organisms developed in the meat in keeping. Several other forms of meat-poisoning were men-tioned, and the very great need for well-educated meat in-spectors was urged. Sanitary Authorities could not be too watchful in passing meat to be used for human food.

Dr. SCOTT, Medical Officer for Ilkley, read a paper on 'Ilkley as a Health Resort'. The town is situated on sandy soil on the southern slope of the valley of the Wharfe. Above it towers 'a lofty range of rocky healthy hills, called Rombald's Moor, from which rushes in never-failing force

the spring of pure cold water for which Ilkley is famed.' The population had increased from 1,043 in 1861 to 4,732 in 1881. Complete schemes of water-supply and drainage had been provided. The mean annual temperature, on an average of five years' observations, was 48°, and the mean annual range 14°. The average rainfall 35 inches, and the number of wet days 179 per annum. The porous nature of the subsoil allowed of the rain being quickly absorbed. The death-rate during the last five years had averaged a little over 15 per 1,000. Ilkley was well adapted for strumous children, and is of no less service as a restorative to the invalid convalescing from acute and chronic disease. In the early stages of phthisis, or when there was a predisposition to it, patients at Ilkley did well.

It was agreed that the Association should join the North-Western Association in memorialising the President of the Local Government Board to give instructions that copies of reports made by inspectors of that Board should be forwarded to all Medical Officers of Health.

Dr. HINE proposed, and it was unanimously agreed to, that a memorial should be presented to the Registrar-General requesting that Sanitary Authorities should be supplied with additional particulars of the age, occupation, etc., of the population in their districts from the recent census returns.

Dr. Broughton, Heckmondwike, was elected a member.

THE ASSOCIATION OF LOCAL BOARDS AND SANITARY AUTHORITIES.

THE first annual meeting of the newly-formed Association of Local Boards and Sanitary Authorities was held in Manchester on Thursday, and was presided over by Dr. Hewitt, Chairman of the Bury Board of Guardians. Papers were read on 'The Purification of Sewage' and 'The Sanitary Work of Local Boards'. Several resolutions were adopted, one of which declared that an amendment of the 152nd Section of the Public Health Act 1875, is needed, which will remove the ambiguities now existing with reference to the taking over of private streets or roads by local authorities. Other resolutions which were carried expressed satisfaction with the permissive character of the Rivers Conservancy and Floods Prevention Bill, and pleasure that the Government do not contemplate putting the comprehensive powers of the Bill into the hands of any single Conservancy Board for any given basin. A motion was approved recommending that Clause 36 of the Bill should be so amended as to enable a local authority, even when the population of its district does not exceed 10,000, to act as a Conservancy Board for such district.

AWARDS OF THE SMOKE ABATEMENT EXHIBITION.

Awards have been made in the following sections :—

Gas Section.—To Messrs. Thompson Brothers, of Leeds, a gold medal for their patent kiln and baker's oven, being a distinctly new application of the use of coal gas, and one calculated to largely promote the abatement of smoke.

Cooking Stoves.—(A) Stoves suitable for families of about twelve persons.—To Messrs. H. and C. Davis and Co., of Camberwell, silver medal; to Messrs. Beverley and Wylde, of Leeds, silver medal; to Messrs. J. Wright and Co., of Birmingham, silver medal; to Messrs. Stark and Co., of Torquay, silver medal, in recognition of the principle adopted by them of burning the gas outside the oven in which the cooking is carried on; to Messrs. Billing and Co., New Oxford Street, bronze medal; to Messrs. Leoni and Co., New North Road, London, bronze medal; to Mr. C. Wilson, of Leeds, bronze medal; to Messrs. Waddell and Main, of Glasgow, bronze medal. (B) Stoves suitable for large establishments.—To Messrs. Slater and Co., of Holborn, silver medal, for excellence of material and workmanship.

Heating Stoves.—(C) Close stoves, from which the heat is conveyed into the apartment by conduction from pipes or chambers, through which the heated products of combustion pass.—To Messrs. Stark and Co., of Torquay, for Cox's ventilating gas-stove, a silver medal; to Messrs. the Sanitary and Economic Supply Association of Gloucester, for Dr. Bond's Euthermic ventilating stove (pattern A), a silver medal. (D) Open stoves or combination fires, in which gas is burned in combination with solid materials, and the heat radiated into the apartment.—To Messrs. Waddell and Main, of Glasgow, for gas and coke fire (Dr. Siemens' principle), a bronze medal; to G. Wright and Co., Rotherham, for gas and coke fire (Dr. Siemens' principle), a bronze medal. (E) Gas-baskets or fires, from which the heat is conveyed by radiation.—To Messrs. Leoni and Co., New North Road, London, for hanging gas-fire, a bronze medal.

In the section for *Mechanical Stokers.*—To Mr. George Sinclair, Albion Works, Leith, a silver medal; to Messrs. T. and T. Vicars, 29, Seel Street, Liverpool, a silver medal; to the Patent Steam-Boiler Company (Knap's stoker), 28, Heneage Street, Birmingham, a bronze medal; to the Chadderton Iron Works Company (Limited), 10, Mark Lane, London, E.C. (M'Dougall's stoker), a bronze medal; to Mr. James Proctor, 5, Albion Terrace, Burnley Lane, a bronze medal.

Fire Bridges.—Bronze medal, Messrs. Chubb, London, for their cast-iron semi-circular fire bridge; bronze medal, Messrs. Ireland and Lownds, Leek, Staffordshire, for cast-iron tubular fire bridge.

Fire Bars and Grates.—Silver medal, the Wavish Patent Fuel Economiser Company, London, for the application of vertical grates in steam boiler furnaces; bronze medal, J. Farrar and Co., Barnsley, for Barber's under-feeding step grate; bronze medal, Mr. J. Collinge, Oldham, for Blocksage's external inclined grate; a silver medal, the Livet Boiler and Furnace Company, Finsbury Pavement, for Mr. Livet's method of setting boilers and for fire bars.

Furnace Door.—Bronze medal, W. A. Moreton and Co., Blackfriars Road, for a balanced fire door; bronze medal, the Great Britain-Smoke Consuming Company, Mansion House Chambers, E.C.

THE SHONE SYSTEM OF SEWERAGE AT EASTBOURNE.

THIS system has been adopted at Eastbourne, where the rapid increase of the town has necessitated some addition to the sewers constructed eighteen years ago. The Shone system is applied as follows:—At a certain point, the outfall from the town sewer is diverted to three large Shone's Patent Pneumatic Ejectors, placed below the surface of the ground. These ejectors consist of iron cylinders, each 4ft. 6in. internal diameter, and having each a discharging capacity of 500 gallons per stroke. The guaranteed maximum discharge from the three ejectors was 1,250 gallons per minute, but their actual performance has reached 3,800 gallons per minute during high tide. The vertical lift from the ejectors against full tide is about 22 feet. The power employed to eject the sewage from the ejectors is compressed air, generated by means of a pair of Sturgeon's Patent Trunk Air Compressors, situated about 350 yards distant. These engines comprise two air compressing cylinders, each 14in. diameter by two feet stroke, driven by two steam cylinders, each 10½in. diameter by two feet stroke, fitted with Parson's Patent Adjustable Expansion Gear, and with condensers. The air is compressed into four large air reservoirs, each 6ft. diameter by 18ft. long. From these receivers, the air is conveyed through a 6in. main to the large ejectors at the 'Archery Tavern', which we may call the outfall ejectors. Another main, 4in. diameter, conveys the air to the Wish Valley, about two miles distant, where it works a pair of ejectors placed under the street, opposite the Devonshire Park. These ejectors are each 3ft. diameter by 8ft. long, and take all the sewage from the houses in the Wish Valley lying too low for direct connection to the main sewer, and lift it a height of about 22ft. into the main sewer which flows by gravity to the outfall ejectors. The discharging capacity of each of these ejectors is 350 gallons per minute. The air is supplied from the receivers to the outfall ejectors through a

reducing valve, regulating the air pressure to the varying height of lift, and averaging about 7lbs. per square inch of pressure. And to the Wish Valley ejectors through a similar reducing valve, which maintains 12lbs pressure for the Wish station, no matter how much higher the pressure in the receivers may be. This enables the receivers, which are capable of holding 6,720 cubic feet of air, to be charged up for night work to, say, 45lbs. pressure, which is sufficient to provide for sixty discharges of the Wish Valley ejectors during the night, or more than sufficient for any possible *night* flow, thereby avoiding the necessity of keeping the engines running during the night.

THE DRESS OF THE PERIOD.

AN Exhibition of Ladies' Hygienic Wearing Apparel has lately been held under the auspices of the National Health Society, and destined to illustrate the lecture on the Dress of the Period, lately delivered by Mr. Treves for the same Society. In this lecture, Mr. Treves commented severely on the but too prevalent practice of compressing the female figure by the pressure of tight and ill-constructed stays, the weight of clothing hung usually from the female waist in the form of superfluous skirts, trimmings, and flouncings, the various evils caused by wearing tight boots and high heels. In the Exhibition under notice there were shown some laudable efforts to remedy these evils, and yet to sufficiently sacrifice to the Graces so as not to lose the grace and beauty of line, which we could ill afford to spare, in the appearance of the female community.

First and foremost, as a practical contribution to this end comes Mrs. Beck's divided dress. This dress consists of a jacket bodice, easy, yet neatly fitting, and a nicely draped over-skirt, or, if preferred, the entire upper garment can be made in what is known as a polonaise or princess short dress. The distinctive feature of the costume, and that which gives it its name, is the under-skirt or petticoat,

which, made of the same material as the over-dress, is cut like a petticoat at the upper part, sewn on to a broad flat band, and stitched up about half a yard from the bottom, so as to form, as it were, trouser-legs, these legs being trimmed with wide kiltings, so that, should the dress be accidentally lifted, or as some ladies wear the over-dress shorter than the divided skirt, and the divided skirt be exposed to the profane eyes of the curious public, the fair wearer will, at least, not have the appearance of wearing the breeks. This dress, which is supplied in various styles and materials by Mrs. Beck, of 24, Connaught Street, Hyde Park, has many excellent points from a hygienic point of view. It is warm when made in woollen materials, easy fitting, though neat in appearance, and excellent for walking in muddy weather, climbing, yachting, riding in those benighted countries where ladies ride *en cavalier*, playing lawn tennis, and, in fact, for all purposes where ease of locomotion, lightness, warmth, and general comfort are desiderata. It may be noted that this costume is a modification of one designed by Mrs. E. M. King, and illustrated in the SANITARY RECORD of June 15, 1881, the latter having two top skirts or tunics, instead of one, as in Mrs. Beck's dress.

Passing on to evening dresses, Mrs. Pfeiffer showed some elegantly designed and embroidered dresses, after a modified Greek fashion. These dresses, though possessing considerable beauty of line and colour, are not likely to be generally adopted, as they require, in the first place, a tall and slender figure, which is not given to all women, and also an expenditure of money, time, and thought in their design and carrying out, which, also, are not at the disposal of the sex generally.

Hamilton and Co. showed some dresses, agreeable in design and colour, and, from a certain squareness of cut, calculated to abolish any necessity for tight lacing. It seems to us that many pleasing and useful hints as to form and ornamentation might be taken from these quaint and dainty robes, but here again we fear that expense may prove a bar to the general adoption of the gaugings and pleatings which give them their special character, though by no means necessary in a hygienic point of view.

Messrs. Lewis and Allenby showed a neatly designed dress of the Princess type, a form, of which it may be noted, that whether from the point of view of simple elegance, a due display of the lines of the 'human form divine', a healthy distribution of weight, nothing better or more sightly has ever been devised.

Mrs. Priestly exhibited a black satin robe, so devised as to avoid any pressure round the waist, when undesirable, and yet of a remarkably neat, nay elegant, appearance.

It may be gathered from the foregoing remarks that, with the exception of Mrs. Beck's dress, which we heartily recommend for the purposes already specified, no authoritative model for ladies' gowns was exhibited, although there were some praiseworthy attempts in the direction of ease and lightness. Meantime, a woman of sense and discrimination can, from the models placed before her by the linen drapers, dressmakers, and even the monstrosities of the fashion books, have constructed dresses which sha l be simple, elegant, and suitable to the occasions for which they are needed. Let her select a form with lines suited to her size, age, and figure; reject all unnecessary frillings, flouncings, draperies, kiltings, and such-like devices for the cutting up of material and the disfigurement of the human form, only retaining such an amount as is necessary to grace and elegance; substituting lace and embroideries wherever practicable; let her steadily make a stand against foolish and undue adornment because it is 'fashionable', and she will be able to construct for herself dresses which shall neither constrict the waist nor overweight the body. She will thus, whilst consulting her own health and pocket, contribute her quota to the agreeable appearance of society at large, a consideration by no means to be despised, from various points of view, and not so frivolous as it may appear at first sight.

We now come to the great stay question. Here, whilst having a full knowledge of the evils caused by tight lacing, and the unquestionable advantage to be derived from the free and full play of the heart, lungs, and other internal organs, we cannot expect all women to throw off their stays. It is probable that, from the force of habit many adult women derive comfort from the use of a reasonably fitting corset, of course not tightly laced, but with just sufficient hold to give a feeling of support, which, from various reasons, unnecessary to enter upon here, is a desideratum with many women past their youth. Neither, from the point of view of agreeable appearance, would it be fair, either to wearer or spectator, to ask stout and middle-aged women to leave off their stays, and appear in all the consequent ungracefulness of uncontrolled obesity. In this, as in most other affairs of life, we venture to think that a middle course is best; let no blandishments of fashionable stay-maker tempt the individual who is 'fat and forty' to squeeze herself into torturing walls of whalebone, with the view of attaining an impossible symmetry, at the loss of digestion and health, but she can choose a sensibly made corset, which will give the needful support and neatness of appearance. It would no doubt be a great improvement if mothers never accustomed their girls to

the use of stays; they would then never feel the want of them, and with a proper use of gymnastics and athletic exercises in due measure, it is probable that the figure would naturally acquire a firmness and natural development, which might completely obviate the necessity of wearing corsets in after-life. For those, however, who have always been in the habit of wearing stays, and, for the reasons already glanced at, cannot dispense with them, there were some good models provided at the Hygienic Dress Exhibition. The model which seemed to us to combine a due regard to the contour of the female form with softness and suppleness, was the one designed by one of the pupils at Girton College, and adopted in that classic retreat, where we are glad to find that the Muses and the Graces consort amicably together.

Mrs. Steele, of Tunbridge Wells, also made a very elaborate display of corsets, for which she claims the merits of porosity, elasticity, absence of pressure on the vital organs, and presence of the necessary support. These corsets are approved of by Mr. Treves, the lecturer whose able lecture was the occasion of this Exhibition, and by the National Health Society.

We were glad to see a good variety of the now much worn combination garment, which (we believe of American origin) is one of the most sensible improvements in women's dress that has been originated for many years. By wearing the warmer makes of this garment, the radiation of caloric is to a great extent prevented; the loins are eased of the burden of a multiplicity of under skirts, and consequent warmth and facility in moving about are secured; last, but not least, in feminine eyes, a good figure is naturally displayed with a concomitant gain of health and comfort. Mrs. Beck's divided dress, worn with a combination garment, is one of the most comfortable and healthy arrangements of feminine dress that can be worn, and involving no sacrifice of that agreeable appearance which all women should endeavour to present.

High-heeled boots are the favourite objects of attack by the apostles of hygiene, and, accordingly, there were at this Exhibition a variety of foot-gear, intended to allow of the proper development of the natural shape of the foot, and of its use in walking according to its anatomical motors. Mr. Hall, of Edgware Road, has devised a form of hygienic boot, destined to avoid the evils of compression of the foot. To obtain this result they are shaped exactly to the natural form of the feet, being sufficiently broad across the tread to prevent pressure, or treading over at the outer side, and at the same time fitting the foot with neatness and comfort. The heels are made broad and low, so as to distribute the weight of the body evenly through the feet, and not upon the joints of the toes only. Thus it will be seen, that all the usual objections to the boots of the period are literally cut from under the feet of the wearer of Mr. Hall's boots.

Messrs. Waukenphast showed some very well-cut boots, which appeared to combine sightliness with reasonableness; and Messrs. Dowie and Marshall had a good display of their boots adapted to those persons whose feet have become more or less deformed by excrescences induced by tight or ill-fitting boots.

From boots to stockings is a natural transition, and here Messrs. Morgan and Ball, 173, Strand, aroused the curiosity of the ladies by their digitated socks and stockings. 'Whatever can they be for, my dear?' was heard on every side; until authorised explanation showed these stockings, made with separate pieces for each toe, as gloves are made for the hand, are said to be invaluable to those who suffer from damp or tender feet, or those persons who walk a great deal. They are manufactured both of silk and wool, and fit so neatly that, if necessary for considerations of warmth, a thick sock or stocking can be worn over them without any inconvenience.

The benevolent individuals interested in the improvement of feminine costume, with regard to health, must have been gratified with the desire shown to acquire information on this subject. Mr. Treves's lecture was obliged to be repeated in consequence of the crowds of ladies who were unable to obtain admission at the first delivery. The exhibition of hygienic dress was crammed with interested visitors, and some thousands of ladies paid their shillings for admission to view the models exhibited. In fact, such was the interest and curiosity shown about the exhibition by all classes of female society, that it is intended to hold another on a much larger scale, to which all having ideas or inventions respecting the hygiene of woman's dress will be invited to contribute. There can be no question of the practical utility of these lectures and exhibitions. If all women are not prepared to entirely sacrifice appearance to health, there can be no doubt that the tendency in the dress of the present day to provide for warmth, abolish useless weight and allow ample room and verge enough for walking, boating, lawn-tennis, and similar outdoor amusements, is on the increase; and the next thing is to carry the same principles into evening and ceremonial costume, which, however, as we have already pointed out, is greatly a matter of individual taste and good sense.

THE MANCHESTER SMOKE ABATEMENT EXHIBITION.

AT the present time, interest in the abatement of smoke is drawn towards Manchester, where an exhibition similar to that held at South Kensington, has been opened since the 18th of last month. It is quite evident from the interest they have evinced that the eradication of smoke is a 'consummation' as 'devoutly to be wished' by the authorities of this great manufacturing centre as to us in the Metropolis itself; and there is every probability that other important provincial districts will follow in the footsteps of the cotton Metropolis. Manchester, like ourselves, has, no doubt, long been fully alive to this nuisance, from which they suffer probably in as great a, or even greater, rate than London itself; and it is to the action taken by the Manchester and Salford Noxious Vapours Association, in connection with the Sanitary Associations of the dual locality, that the inauguration of this exhibition is due. Assisted by the London Committee, who will at all times be ready to lend their powerful aid to any provincial undertaking having the same object in view, a strong executive was quickly formed, and, with Mr. Fred. Scott as secretary, the exhibition was arranged in a very short space of time, and almost as soon as the corridors at South Kensington were cleared, a large portion of the exhibits there shown were in their place at Manchester.

The exhibition is being held in a new building called Campfield Market, in Deansgate, and though not so large as that we have recently been holding in London, contains some of the best of the apparatus and appliances there shown. Many of the exhibitors from the London display have entrusted their inventions to local agents, and in one or two instances we observed that Manchester firms were representing several different exhibitors. With all due deference to the good intentions of the agents, we cannot think this plan can prove satisfactory to the several parties represented; for an agent can scarcely be expected to hold the same views as the inventor himself, particularly where he happens to be the depository of appliances from rival makers, that to some extent, at least, clash with each other. Neither can he be expected to be fully cognisant of all the little details connected with an invention like the owner; and it may happen that, although actuated with the most laudable desire to do justice to his principals, he may fail to put it before the visitors in its best form, simply from imperfect knowledge. These remarks apply more particularly to new inventions and to those that have to be kept in action; but the agent cannot be blamed for this. The inconvenience or loss accruing therefrom must necessarily redound upon the proprietor of the article, who, if he adopts this mode of exhibiting his goods, must be content to take all such risks.

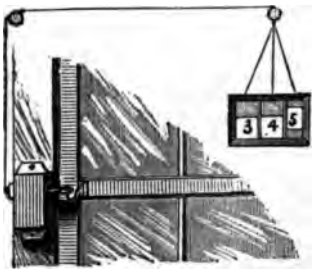
Coming so quickly after the London exhibition, and considering that so many of the exhibits from South Kensington were sent to Manchester, we scarcely expected to find much that was new, and a walk round the building strengthened this opinion. True, there are articles there

that were not amongst the London collection, but they do not bear so much upon the question of smoke abatement as upon other matters.

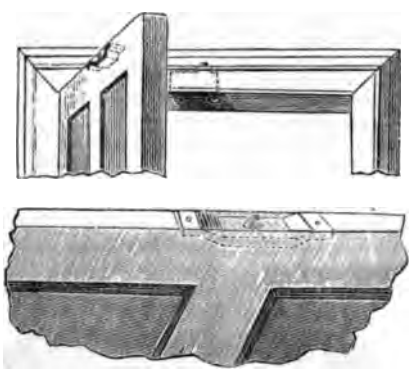
It was originally intended that the exhibition should be open for one month; but such is the interest taken in it, that a movement is on foot to extend the time, and we trust that the exhibitors will accede to the request of the Committee. In a few days at latest, the whole of the awards (some of which are published at page 422) given at South Kensington will be known, and this amongst the prize-takers will influence sales. As it is probable that a few new appliances connected with smoke abatement may yet be introduced, we shall defer any remarks upon novelties in this direction until our next issue.

The manufacturers present, with whose appliances we have made our readers acquainted in connection with the London Smoke Abatement Exhibition, in the issues of December 1881, and January and February of the present year in the SANITARY RECORD, are Messrs. Rosser and Russell, Charing Cross; Smith and Wellstood, Glasgow; Wilson Engineering Company, High Holborn; Collinge, Oldham; Eagle Range and Foundry Company, Fleet Street and Birmingham; Constantine (Treasure Range, etc.), Fleet Street; Edwards and Son, Great Marlborough Street; Musgrave and Co., Limited, New Bond Street, and Belfast; Hoole, Henry E., Green Lane Works, Sheffield; Parker, Clifton Villas, Prince of Wales' Road, Battersea Park; Crosthwaite, Upper Thames Street; Hollands, 37, Newington Green; Newton, Chambers and Co., Thorncliffe Works, near Sheffield; Sunlight Stove Company, Blackfriars Street, Manchester; Deane and Co., London Bridge; Clark, Bunnett and Co., Rathbone Place, London; Comforth, Alpha Foundry, Birmingham; The Coalbrookdale Company, Shropshire; Portway and Son, Halstead, Essex, represented by Messrs. Hydes and Wigfall, Sheffield; Waddell and Main, Glasgow; Smith and Stevens, Leicester Square; Harry Hunt, Newington Green, London; Farwig and Co., Queen Street, London, E.C.; Wavish, Patent Fuel Economiser Company, 110, Cannon Street, London, E.C.; Petter, Yeovil; Taylor, Wood Green, London; Wilson, Leeds; Slater and Co., High Holborn; Strode and Co., Osnaburgh Street, Regent's Park; Mart and Bradley, York Street, London Road, London; Jno. Wright and Co., Birmingham; Stark and Co., Torquay; Lawrence and Co., St. Mary Axe; Perret, Paris; Vicars, Liverpool; Thompson Brothers, Leeds; Newton J. and Son, Oldham; Andrews, Salford; Proctor, Burnley; Waller and Co., Southwark; Chadderton Iron Works Company, Chadderton, Manchester; Henderson, Liverpool; Ireland and Lowndes, Leek; Duncan Brothers, Queen Victoria Street, London; Great Britain Smoke-Consuming Company, Limited, London; Patent Diagonal Rocking Fire-Bar Company, Palmerston Buildings, London; Hunter and Co., Leeds; Sinclair, Leith, and The Edford Colliery Company, Bath.

Amongst the new inventions, not bearing upon the abatement of smoke, but nevertheless of a useful character to all householders, was Braham's Self-Acting Fire-Alarm Fire-Extinguisher, and Burglar-Alarm. Taking the latter for our present description, we may remark that the very unsafe manner, in which a large number of our modern houses are left by the builder, renders it a matter of necessity for the householder to find some reliable means by which he may hope to checkmate the attempts of the modern burglar to enter his domicile. As we cannot expect a tenant to enter upon heavy expenses in the shape of expensive safeguards, in the way of costly shutters and such kindred appliances, he may, however, guard himself against nocturnal visitors by attaching to such windows or doors, where an entry is likely to be effected, a simple apparatus in the form of a burglar-alarm, which, in the main, he may easily remove to another dwelling. That such an idea is not new, we are free to admit. Latterly, such appliances have been made to work by electricity, but many objections may be urged against them, but there is no doubt that a simple appliance that can be actuated by wires, in a somewhat similar manner to that by which the bells of a house are arranged, is the most economical, reliable, and best. Such an apparatus is that invented by Mr. Braham, of Stretford Road, Manchester, and which, judging from the manner in which it works, is the most perfect appliance of its kind that has come under our notice. We append engravings, showing its application to doors or windows. Its application to windows is shown in the first engraving, at the side of



which is fixed a small iron or brass box, which contains a spring, and a slotted piece of brass, through which is passed a ring secured by a cord, and on the window-sash a hook is fixed. From the box is attached a wire, which can be carried to any part of the house, say to a bedroom, for instance, and is connected with a dial-plate as shown in the engraving. In connection with this is also fixed a gong or alarum. Immediately the window is attempted to be raised, the ring on the hook is drawn upwards by means of the cord, which sets the spring in motion, and releases the alarum, which, of course, commences ringing, and continues to do so until the spring has run down, and it is almost needless to add that the alarm thus raised will arouse the soundest sleeper and frighten the thief. At the same time the dial-plate will raise one of its sections, showing the room at which the attempt to enter is being made. For a door, the arrangement is somewhat similar,

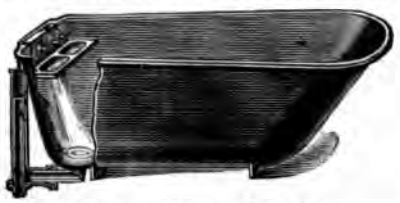


the box being fixed into the framework, and the hook on the door itself, as shown in the two accompanying engravings. We may add that, although wires may be attached to every room and window in a house where an entry is likely to be effected, it does not interfere with any of them during the day time, unless they are fixed in position. On retiring for the night each ring is placed on its hook, and by drawing down a simple lever, placed in any convenient position, and secured on a hook, the whole of the wires are set in a state of tension, and the slightest attempt to meddle with the door or window will set the alarm going. Should the wires become loose, a simple arrangement is provided by which proper attention may always be retained; and we are quite confident that, with the simplest care, this appliance may be made to answer its purpose effectually for years without additional cost. The fire-alarm, which is equally efficacious, space prevents our entering upon in our present number, but we propose to revert to it with illustrations in our next issue.

THE BUILDING EXHIBITION AT THE AGRICULTURAL HALL.

NEXT to the display that is annually brought together under the auspices of the Sanitary Institute of Great Britain, the Building Exhibition, which has recently passed the third year of its existence, is the one of all others amongst the now numerous collections that have taken root in the Metropolis, which, from a sanitary point of view, interests the readers of this journal. Though named a Building Exhibition, it was intended by its promoter to combine interior appliances and decorations, as much as the materials of which our houses and public buildings are constructed. Mr. Black, to whose perseverance the inception of the scheme is due, has succeeded well in his task, and has had the satisfaction of seeing, each year, a marked increase in the exhibits, and in the firms of high commercial position who have helped to fill the ground at his disposal in the Islington Hall. There was a decided advance in the quality of the exhibits at the Exhibition under review. Messrs. Gillows, of Oxford Street, and Messrs. Hindley of the same locality, contributed some of their best specimens of decorative furniture; and the Coalbrook Dale Company, Messrs. Yates, Haywood, & Co., and Messrs. Steel and Garland, as manufacturers of grates, marble mantel-pieces, and decorative iron-work, and Messrs. Doulton & Co., Stiff and Sons, Wilcocks of Burmantofts, Leeds, and Messrs. Cliff of Wortley, lent their aid towards the Building Exhibition, by putting forth their strength in the decorative appliances in clay with which their names are so intimately associated. In constructive materials, examples of almost all the artificial stones and concretes were shown, including bricks, both plain, glazed, and ornamental, string courses, architectural terra cotta, artistic panels for exterior decoration, roofings, terminals, chimney pots, etc., while in interior appliances scarcely an article tending either to necessity, comfort, or luxury was without its exhibitor.

Messrs. Steven, Brothers, & Co., of 35 and 36, Upper Thames Street, and Glasgow, made an excellent show, comprising Architectural, Sanitary, and General Ironwork, Stove Grates, Kitcheners, etc. This firm made no attempt to display their goods *in extenso*, or they might have occupied a much larger space, but sent an assortment of their numerous articles, all of which they manufacture themselves, and the exhibit was second to none. Messrs. Steven, Brothers, & Co., as manufacturers, are noted for the superior class of baths in cast-iron. Several specimens of them were shown—finished sienna marble and white enamelled. This enamel is of such a nature that it expands and contracts with the iron when used with hot water; it is thereby very durable. Amongst other advantages this pattern of bath possesses is, that it is the largest complete bath with fittings in the



smallest possible space. The hot, cold, and waste, as well as soap-dish, are very conveniently placed inside the bath, so as to be easily reached by the person bathing without getting out of the water, yet the necessary appliances do not project unnecessarily. For this reason, the baths are more easily and economically fixed, all trimming of wood-work round fittings being dispensed with, while not the least important feature is that in the case of valves wearing and getting leaky, the water falls into the bath, where it cannot do any damage. The selection of stove grates shown here was admirable, consisting of best and medium class goods, the designs being particularly choice. The 'Westminster' Grate is the latest addition to the smoke-preventing class, and, therefore, claims special attention. It is on the slow-combustion principle, and has an air-chamber at back. The air is admitted into this chamber from below the bottom of the grate, and from thence it passes through a narrow horizontal opening in the fire-clay lump behind the fire, where, mixing with the burning fuel, it perfects combustion, and prevents the formation of carbon. Although this stove is of quite recent invention, it was shown in some beautiful styles; one, fitted with very handsome tile panels, of Grecian design, and mounted with richly-chased solid brass mounts, attracted our attention, as did also one finished in electro-bronze with repoussé panels, as well as many others. They were for the most part arranged with fenders, fire-brasses, and tile hearths *en suite*, some of them being very effective. The firm have long been celebrated for kitcheners, and as a proof of their superiority and originality, we may mention they obtained for them the first award at the Melbourne Exhibition, 1880, and the highest award at the recent Eastbourne Exhibition (in both cases silver medals). Amongst the most important features of these ranges is, firstly, to a very large extent they consume their own smoke and will burn any kind of fuel; secondly, they are fitted with patent ventilators, which carry off all the smell of cooking—a most desirable attainment; thirdly, the ashpit linings, which are usually of brickwork and have to be fitted by the bricklayer, are of iron, so that the trouble and cost of fixing are much reduced. Lastly, they are made in a number of pieces, so as to save breakage by expansion and contractton, and should an accident occur to any of the working parts, it can be replaced with the least possible trouble, while the arrangement of the dampers, plate rack, etc., leaves nothing to be desired. Some new patterns of Queen Anne fences and gates for dwarf walls were simple and elegant, as well as others of balusters, newels, etc. The display of lamp columns comprised some very good designs, and, being fitted with gas, were lit up at night, and produced a novel and pleasing effect.

The Coalbrookdale Company, who appeared for the first time as 'direct' exhibitors, although their goods have been shown on former occasions by some of their agents, had a tasteful erection that was unique in its character, the principal feature, a pavilion in ornamental cast-iron, being the first of its kind ever made. The ground area of the space allotted to them was fenced round with panels of ornamental cast-iron fencing and railing, gates, etc., with the view of showing as many patterns of this class of work as the room permitted. Amongst these were some remarkably cheap specimens of villa gates; but the two objects in this portion of the exhibit to which attention was most directed were a pair of carriage entrance gates, and another pair for foot entrance, from designs by Maurice B. Adams. It is almost unnecessary to add that their 'lines' were entirely original, and were of most elegant outline. They may be termed of the 'advanced Queen Anne style, and were coloured in what is now understood as a 'low-toned green'. Around the interior of the base were massed a variety of register and other grates, in many of which tiles were freely used. The designs of most of these grates and their surroundings were of Queen Anne and Old English styles, interspersed with specimens of a decidedly æsthetic character, and possessing a quaintness that is almost peculiar to this Company. Ascending a staircase of cast-iron, the sides or balusters of which were in their turn made up of many ornamental designs, to display a variety of pattern, we stood upon the top floor of the structure, which was in reality the ground floor or base of the pavilion. This was a rectangular structure entirely of ornamental cast-iron. It contained entrances, pediment, and oriel bays. Running round the structure to the height of from three to four feet was a railing of ornamental work, then an opening of about the same depth, then a deep frieze, partly in small squares, and partly in an ornamental design, this being filled in with cathedral glass, in low-toned colours, and intended as a substitute for the leaded frames usually made use of for this kind of glass. This arrangement necessarily adds strength to this portion of the structure, and considerably to its appearance as a whole, whilst it is quite at the option of the owner to use glass at all. Without it, we look upon as

ornamental frieze, though the addition of the glass adds much to the general *ensemble*. The pavilion is painted in the same colour, green, we have before described, the design being of the Queen Anne character, and of elegant though neat appearance. In the centre of the pavilion were arranged several suites of *garnitures*, consisting of unique iron mantels and over-mantels, mainly of the 'Adams' style, similar to those shown by the Company at the Smoke Abatement Exhibition, and which were described by us at the time; grates, tile hearths, fenders, etc. The mantels were all in the neutral tints now in vogue; the exhibit in its entirety being one of the most attractive features in the Exhibition.

The collection of grates, stoves, chimney-pieces, etc., contributed by Messrs. Steel and Garland of Holborn Viaduct and Wharncliffe Works, Sheffield, were of a distinguished character. A handsome classic register-grate with De Morgan art hand-painted tiles and bronzed and brass dogs was one of the gems of the exhibit, and a fine example of an Italian renaissance grate was equally conspicuous. A Queen Anne hob grate, with handsome polished brass spandrils and plaques, designed by Mr. H. J. Talbert, though of a totally different character, was quite as commendable. Another, in which the æsthetic peacock-blue and amber tiles predominated, appealed strongly to those who favour this advanced style; and we must not forget to mention the 'Wharncliffe', named after their works, their well-known heating and ventilating grate, capable of emitting 15,000 cubic feet of warmed air from the outer atmosphere into an apartment in one hour, and which has received detailed description at our hands on former occasions. On this occasion their exhibits of chimney-pieces were confined to wood, and made a pleasing contrast to other displays when marble was in the ascendant. Walnut was the predominating wood, and was shown in various kinds suitable for bed-rooms, hall, or reception rooms, one in the Queen Anne style for a morning room, with china cupboard, glazed doors, and brass grilles being very attractive. A fine specimen in oak was another notable feature; also one in teak, in the Italian style, ostensibly made for a billiard room. A pretty specimen in the old English style, ebonised, and intended for a small drawing-room, also drew our attention; and the collection of tile hearths, brass-fenders, and the kindred appurtenances, all displayed considerable taste in their selection for companionship, and helped to maintain the reputation of the firm for high-class workmanship.

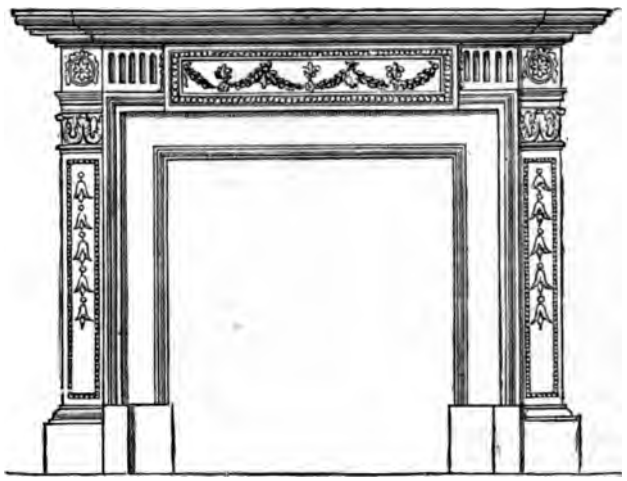
Messrs. Yates, Haywood, and Co., of Upper Thames Street, and the Effingham Works, Rotherham, one of the oldest and most distinguished houses connected with the manufacture of grates, fenders, and the usual *entourage* of the fire-place, as well as of kitchen ranges and all kinds of ornamental ironwork, occupied Bays 1 and 2, and well maintained the reputation of their firm in the class of goods exhibited. For many years past Messrs. Yates, Haywood, and Co. have been extensive manufacturers of marble chimney-pieces, and the sole *concessionaires* of some noted quarries in France, from which is excavated a fine marble, named *Gris rouge*. They exhibited a massive mantel-piece of this material encased with tiles in brown and neutral green, in what is termed the moss style of decoration, that had a pleasing effect. There was a handsome mantel-piece in Blanc *clair*, with over-mantel holding a bevelled glass mirror of French design, inlaid with Siena, and showing some exquisitely carved leaf tracery, the grate accompanying it having hand-painted tiles of a highly æsthetic character. A fine statuary marble chimney-piece with inlayings of Siena, in Louis Quatorze decoration, the centre panel, richly carved, representing Music and the Arts, was undoubtedly one of the gems of the Exhibition. The grate contained in this was richly chased in brass, and the sides were composed of hand-painted tiles, representing Fatima and Cinderella in artistic colouring. There was also a pure Adams' mantel-piece with Siena pillars, and statuary capitals and bases, the principal panel representing 'Bacchantes,' a brass grate, with hand-painted tiles, portraying Spring and Winter, with sunflower and pomegranate decoration, which was greatly admired. Another 'Adams' chimney-piece in statuary marble, the carving composed mainly of those graceful festoons favoured by that popular architect, formed a pleasing addition to the exhibit, and an elaborate iron mantel after the same master, containing a neat grate, the interior composed of fire-brick, was notable for its clear delineation of pattern. There appears to be a growing feeling against wood chimney-pieces, caused by the occasional warping of the wood from the heat of the fire, and Messrs. Yates, Haywood, and Co. are cultivating the introduction of marble and glass and iron and glass over-mantels in their place. We may add that all the specimens we have mentioned, besides others that space prevents us entering into, contained the usual adjuncts, viz., tile hearths, fenders, fire brasses, rests, etc., all of which were notable for their suitability in design, and the high finish bestowed upon them. Descending to the kitchen, the firm introduced us to a fine specimen of a kitchen range, 9 feet long, with complete tile back and sides, and nickel-plated mounts. This range had a specially constructed and large oven for baking bread, and in its more humble but no less necessary attributes, was one of the 'features' of the Exhibit. We may add that Messrs. Yates, Haywood, and Co. are the manufacturers, for Government, of Captain Galton's grates.

The largest collection of chimney pieces, grates, fenders, and the usual appendage of the fire-place was contributed by Messrs. Ashton and Green, Limited, Bury Street, St. Mary Axe, Dublin, Bristol, and elsewhere. This Company, who are in addition extensive state quarry owners in North Wales, have, amongst other important buildings, supplied the slates for the new Law Courts. They are also manufacturers of marble mantel pieces by machinery at their works at Bow, as well as of enamelled slate (for which latter they are justly celebrated), and of which a variety of specimens were shown in imitation of many costly marbles. The collection of high class marble chimney pieces was large and of a *recherché* character, and the grates and other accessaries were no less remarkable for their costly finish, some of the hand-painted tiles being exquisite specimens of the painter's art. A notable feature essayed by the firm is the introduction of a richly painted larged-sized tile in the centre of the hearth, the surrounding ones being generally plain, and by this contrast bringing the picture out more fully. The idea is novel, and although there may be found those who may object to it, as works of art we cannot but admire them. The firm also exhibited samples of slate cisterns, suitable for domestic purposes, and on a larger scale for brewers, and other manufacturing purposes.

The most varied exhibit in the building was that of Messrs. Wells and Co., Commercial Iron Works, Shoreditch. The firm have been extensive contributors to this Exhibition since its inauguration, and have occupied the largest space of any single exhibitor. Architectural iron works formed a large feature in the display, amongst it being some very good specimens of wrought iron gates, etc., made at the works in Shoreditch. Kitchen ranges, from the 'Cotters' to that suitable for the mansion, and finished with all modern improvements, formed another department, and accompanying these were restaurant grills of a cheap class, with others finished in a more costly manner for establishments of a higher order. Next in order were a collection of register and other grates and stoves, mantel pieces, pier glasses, and the usual appendage of the fireplace, in a diversity of styles, many being of a high order of merit. Baths, lavatories, and numerous sanitary appliances, covered a considerable space, and a canopied erection containing a superb collection of gas fittings, including some quaint and unique examples, completed the bulk of the firm's exhibits. One feature of recommendation, which the Messrs. Wells may fairly claim, is that owing to the extent of their stock, and the diversified character of their business, everything connected with the interior fittings of houses or public buildings (and many exterior appliances also) in the hardware or metal trades may be obtained from them in any quality and quantity at very little notice.

Amongst the firms who appeared for the first time at this Exhibition, and whose collection deserves detailed

mention, were Messrs. Underhill & Co., 170 and 173, Upper Thames Street. The exhibit was composed of high class Marble Mantel-pieces and complete suites of Grates, Fenders, Tile Hearths, etc., Kitchen Ranges, and some remarkably cheap tile-lined Register Grates. Our space only enables us to make a few selections from the rather extensive display. A very rich Blanc P. mantel-piece, elegantly carved in the Louis Quatorze style, attracted much attention, and a Vert Campan (Pyrenean marble) with a very large and perfect slab and Italian Griotte pilasters, was equally praiseworthy, though totally different in style, and we may speak in a similar manner of a Blanc P. and sienna marble, the grate enclosed in which had a bordering of richly hand-painted tiles, representing the seasons by flowers. There was also a splendid Red Jasper with Italian Griotte marble columns and black marble mountings, which was sold for shipment to the Australian Colonies, and another notable feature was an elegant 'Adams' style of chimney-piece in walnut wood fitted with marble slips. All these and the remaining ones making up the exhibit contained suitable grates, etc., and some thought had evidently been bestowed in the selection of the different articles to complete the *entourage*. Many of the suites were supplemented with *garnitures de cheminée*, some of the clocks and tazzas being composed of the same marbles as the chimney-pieces themselves, lending additional



beauty to the entire effect. We append an engraving of one of Messrs. Underhill & Co.'s chimney-pieces in Blanc P. statuary and sienna marble and which was also disposed of for the destination above-named.

A good display of slow combustion register grates, of moderate price, and combined open and close kitcheners, was shown by Mr. William Addis of Leicester Street, Leicester Square, an old-established manufacturer of these goods. 'Cundy's Patent Economic Cottager's Cooking Stove' struck us as being very compact and complete, and is probably one of the best artizan's ranges in the market. It is said to consume one third less fuel than others of similar size, and will greatly increase the draught, and so tend to prevent a smoky chimney. The oven and boiler space, in proportion to its size, is large, and, being portable, is well adapted for the purpose of an accessory grate in a large establishment. Badger's Patent Kitchener was also shown by Mr. Addis. This is a combined open and close fire-range, the fire of which is sufficiently large to roast a joint in front, independent of the ovens; and, when cooking is over, can be reduced to almost any dimensions by raising the bottom grating, which is effected by a simple arrangement in the front instead of the usual rack and pinion applied to this operation in those ranges where a similar plan is provided. Amongst the Register grates may be mentioned the 'Melrose', as having important features. It is on the slow-combustion principle, but so constructed that a certain amount of hot air is admitted at the bottom of the fire-basket at the back, which, mingling with the gases, tends to promote combustion and so reduce smoke.

Mr. William Stobbs, 10, Victoria Buildings, Pimlico, S.W., shewed an American 'Beebe' Range, a Crystal Fireplace Heater, and a Coalbrookdale Company's Ironbridge Grate, fitted with Parker's patent 'Kyrle' Fire-Basket. These are all constructed to burn anthracite smokeless coal, and are the same as those that recently attracted so much attention at South Kensington; and the advantages they possess, which have been mentioned once or twice before in these pages, place them in the front rank of such appliances. The 'Kyrle' principle is particularly worthy of note, as it is very simple, and can be adapted to any of the modern grates at a trifling cost.

Mr. Harry Hunt, 117, Newington Green Road, N., also exhibited a selection of American stoves for burning anthracite coal, prominent amongst them being the 'Crown Jewel', the 'Fairy', and the 'Economy' Stoves, the particular features of which, in common with those of Mr. Stobbs', our readers have been made well acquainted with in former notices of them.

The Eagle Range Company, of Fleet Street, E.C., showed their specialities in various sizes, the peculiar points of these goods have already been explained before in the SANITARY RECORD, and are now generally known to the public at large. This firm showed a very good trap which is a great improvement on the common D-trap, having a good water seal and meeting the demand for a thoroughly effective and durable trap at a low price.

The Wilson Engineering Co., of High Holborn, another firm of patent portable range makers, also exhibited a good collection of these appliances.

Messrs. H. and C. Davis and Co., of Camberwell, were present with an assortment of their well known gas stoves in all sizes, from the small cosmopolitan family gas cooker to the large roasters suitable for public institutions, etc. The Stanley Patent Smoke Consuming Range, exhibited at the recent Smoke Abatement Exhibition, and of which we gave particulars in the report thereon, was also shown by Messrs. Davis and Co., and caused considerable attraction.

Mr. T. J. Constantine, 61, Fleet Street, had a good assortment of his Patent 'Treasure' Ranges, now so widely known, and extensively adopted by all who study economy in fuel and cooking appliances.

Messrs. Ewart and Son of 346, Euston Road, had a good display of their well-known Crown Boilers, various pattern Baths, and their Patent Empress Ventilators.

The Hygiene Heating and Lighting Company Limited, 16, North Buildings, Finsbury Circus, E.C., and Park Street, Islington, N., exhibited a selection of Clark's Patent Improved 'Syphon' Hygienic and Economic Stoves in various sizes; quick water heaters on the 'Instantaneous'

principle, and other fuel-saving and heating appliances similar to those the firm had at the recent Smoke Abatement Exhibition, and of which we then pointed out the special features.

Messrs. Ritchie and Co., of 23, St. Swithin's Lane, manufacturers of the Lux-Calor Heating and Lighting Stoves, which have been described and figured in the columns of the SANITARY RECORD, made their stand attractive with choice specimens of exotic plants arranged amongst the stoves, illustrating how suitable they are for warming conservatories, halls, ante-chambers, etc., disposing as they do of the deleterious products of combustion without any kind of flue whatever.

An example of the number of manufacturers who applied for space in the Hall, was the fact of the oldest and largest firm of Sanitary engineers showing their goods in the gallery; Messrs. Warner and Sons of the Crescent Foundry, Cripplegate, being a little late in applying for space, were compelled to put up with this somewhat out-of-the-way position. This did not, however, prevent them from bringing together a well selected display of their well-known specialities, comprising patent waterclosets, baths, lavatory fittings, high pressure, and other cocks of every description, hydraulic machinery, and church and school bells. Warner's Patent Special Valve-closets and Improved registered Pan Closets are now well known, and have been largely adopted by many hospitals, and public institutions. No less than twenty-four of the latter kind have been fixed in Guy's Hospital since 1876, and continue to answer their purpose satisfactorily. The salient feature of this closet consists in the substitution of a container or bottom receiver made of pottery, in the place of the usual kind made of cast-iron, thus preventing the corrosion of the container by rust or by the action of the excreta, etc., and, also, the effluvia and noxious vapours which rise therefrom, especially in warm weather, when the handle is lifted, are effectually prevented, and the principal objection to pan-closets overcome. The 'Special Valve-Closet' is fitted with an improved basin and Bower's Patent Overflow Sewer Gas-trap and Patent Supply Valve, with copper-case pneumatic regulator. The overflow is thoroughly sealed against sewer gas, and the valve so placed as to give a full way and prevent choking, while it cannot be overdrawn or become foul, the basins give a quick discharge and thus prevent corrosion. Warner's 'Crescent' Water-Closet, suitable for factories, asylums, etc., was shown fitted with water-waste preventer complete; this being self-acting is simple and efficient and thoroughly adapted for the above purposes. Another article worthy of notice was a portable water-closet or commode fitted to the side with which is a cistern capable of holding sufficient water for several times using, The whole is encased in suitable wood framing, and so arranged as to prevent any escape of effluvia. It is specially valuable for sick rooms, or where a good system of drainage is not established. The specimens of every description of force-pumps, both hand and power, brass deep well-pumps, brass pumps on planks, cast-iron lift-pumps, fire and sewer engines, etc., were all of that superior quality and first-rate finish, for which Messrs. Warner are so well known.

Messrs. Doulton and Co., Lambeth, as usual, made a splendid show, their exhibits taking a range from sanitary stoneware to ornamental articles for domestic use, modelled, in the highest style of art, in that beautiful ware with which their names will always be associated. Amongst them were architectural ornaments in terra-cotta for building purposes, including a bold wheel window with Doulton ware bosses, fountains, garden vases, and a very handsome drinking fountain composed mainly of Doulton ware, designed and made especially to the order of the Rev. Mr. Barnett, of Whitechapel. Within the last few years, Messrs. Doulton have entered the lists as sanitary engineers in the broadest acceptation of the term, and at this Exhibition they have an extensive assortment of fittings appertaining to this department of their trade. Much attention was attracted by the new automatic vacuum flushing tank of simple construction, described and figured in the SANITARY RECORD of February 15, and the water-waste preventer, described in the same number, and their combined, flush-out, trapless, and valve-closets, assisted with regulating supply-valves to prevent waste of water. Of cocks and valves on all principles, housemaids' and other sinks, lavatories of most commendable make and finish, and several specimens of their water filters, as well as those on the Bailey Denton principle, and that of Dr. Bernays, most of which are figured and described in the SANITARY RECORD of 1881-82, received the commendation they so justly merit.

Another good display of sanitary appliances was brought together by Messrs. Hayward, Tyler, and Co., the well known firm of engineers, of 84 and 85 Whitecross Street, E.C. The stand was replete with all kinds of hydrants, standposts, stop-valves, branch-pipes, and connections, suitable for fire-extinguishing purposes, steam and water-valves and cocks, pumps for deep and shallow wells, household and stableyard purposes, mounted on frames and planks, with handles, while the collection of bath and lavatory fittings, water-closets, and water-waste preventers attracted much attention. For the former class of work, this firm specially lay themselves out, and when we mention that they originally fitted up the Turkish baths in Jermyn Street, further comment as to the reputation they have obtained is unnecessary. Of the lavatories shown, one with a light and neat arrangement of tip-up basin on light iron standards with marble top was specially worthy of notice. Their Full-Flush Valveless Closet has some valuable features, and to clearly demonstrate them is shown in action with two or three others, fitted complete with water-waste preventers. The great peculiarity is, that if the handle be lifted and let go at once, the full flush of two gallons enters the pan with great force and thoroughly cleanses every part. No more nor less than two gallons can possibly pass at each flush, and there is no hidden receptacle where a nuisance can exist. The water waste-preventers fitted in connection with these closets are approved by the leading water companies in London and elsewhere, and are simple and natty in appearance, and occupy but little space. A urinal with treadle action is also shown, and is a step in the right direction, as is also a portable closet so arranged, that the shutting of the lid brings the flushing arrangement into action.

Amongst the exhibitors of pottery and terra-cotta, were Messrs. James Stiff & Sons of the London Pottery, Lambeth. The general quality and excellence of their goods is too well known to need any comment. At this stand was to be seen a display of statuary terra-cotta second to none in the Exhibition, some figures of life-size being particularly well executed; they formed a very artistic and interesting feature, as did also the samples of architectural work, such as trusses, strings, medallions, etc., while various descriptions of sanitary ware, including their 'Registered Intercepta' sewer trap and the 'Weaver' ventilating sewer air trap, completed their interesting exhibit.

Messrs. J. Purnell & Son, 15A, Kensington Place, Page Street, Westminster, exhibit their well known Patent Syphon Water-Waste Preventer, for which they received an award at the International Medical and Sanitary Exhibition last year. A glance at the following sketch will show the principle of action. Not the least important of its advantages is, that as soon as the valve (A) is opened the syphon is set in action and the entire contents discharged without the necessity of holding the chain all the time, which is the case with so many water-waste preventers, and, when neglected, is the cause of all those ills and inconveniences consequent upon improperly flushed traps and drains. Messrs. Purnell's plan, however, overcomes these imperfections, and is moreover simple, efficient, and durable. The invention under notice is, of course, only suitable for wash-out or hopper closets, but, owing to the success met with, and the large demand it has called forth, the firm have of late been making experiments with a view to adapting it for valve-closets, the result being that they now produce a Double-Flushing Water-Waste Preventer, as simple and as automatic as the original, and without any additional valve or parts to get out of order. This, used in connection with their Flushing-Rim Basin

and Large Arm, effectually cleanses the trap, and assists in flushing the drain. At this stand are also shown cast-iron soil-pipes, coated with Dr. Angus Smith's solution,

white glazed stoneware channels, straight, tapered, and curved, as well as the various bends, swan-necks, etc., for manholes and disconnecting chambers, cast-iron solid and ventilating manhole covers, without which, for the inspection and easy access to drains, no system of house drainage is now considered perfect.

Mr. Bostel, of 18 and 19, Duke Street, Brighton, and 8, Golden Lane, E.C., had three of his special 'Valveless' Water-Closets, fitted complete with water-waste preventers, and with the back woodwork removed, to allow of thorough inspection and examination of the working parts and flushing arrangements, full particulars of which appeared in the SANITARY RECORD of Jan. 15, 1882, in the report of the recent Brighton Exhibition of Sanitary Appliances. Mr. Bostel also shows a Ventilating Cowl, suitable for soil-pipes and other purposes, which is worthy of attention, as well as Holt's Patent Cylinder Syphon, for cisterns, etc., of which he is sole maker.

Messrs. R. F. Dale and Co., of Bear Lane, S.E., an old established firm of brassfounders, well known for the quality and workmanship of the goods sent forth from their manufactory, have of late been turning their attention to those appliances for the improvement of systems of drainage and ventilation and methods of lighting and heating, the demand for which, owing to the growing interest taken by all classes in sanitary matters, is daily increasing. Amongst the articles shown at their stand which particularly call for notice, were an improved Patent Valve-Closet, a Patent Ball-Valve, Single and Double 'Waste-not' Flushing Cisterns, and a Patent Safety-Valve Tap. The latter article, which is intended for use in pressure kitchen boilers, combines a thoroughly tight draw-off cock and an efficient safety-valve in the one instrument. This fact alone secures for it much commendation, but when it is borne in mind that each time it is used in the former capacity the valve is operated upon, it is at once obvious that the only drawback in many otherwise good safety-valves (viz., that of becoming set or stuck fast by calcareous deposit) is in this completely overcome, thus entirely preventing all explosions. The special features of the ball-valve are its simplicity and perfect immunity from setting fast, no cup leathers or stuffing-box being used, the valve being fitted with a small solid rubber seating, which can be instantly renewed if necessary. Several towns will use no other valve, and two or three of the Metropolitan companies fit them exclusively. They are all tested to withstand high pressure. The waste-not flushing cisterns are strongly made in galvanised wrought and cast-iron, fitted with the patent ball-valves, suitable either for hopper or valve-closets, and offered at a very moderate price. The valve-closets which they make in various qualities, from the lowest with plain white basin, to those fitted with highly finished and handsome dishes, nickel mounts, etc., are all of first-class workmanship, and the basins of the flushing-rim kind. A very important feature is the large overflow, with trapping-box so arranged that it cannot possibly become blocked or untrapped. A division is made in the trap, forming as it were a separate chamber, into which the overflow pipe projects with a considerable dip, and so effectually prevents the ascent of noxious gases from it or the drain. Messrs. Dale and Co. also exhibited a variety of metal force-pumps; commoner iron cottage-pumps with improved valves, as well as every description of plumber's and steam-fittings.

Messrs. Shanks and Co., sanitary engineers, Barrhead, near Glasgow, brought together a good assortment of their numerous manufactures. The salient features of their exhibit were the lavatories, which comprised every pattern and price, from the cheaper kinds mounted, in Japanned iron, to those which, besides being replete with every modern fitting, were unique as specimens of good cabinet work, and the baths and fittings of every description for hot and cold water work. Messrs. Shanks have lately introduced what must be acknowledged by all to be a great desideratum. This was also shown at their stand, and consists of a light frame, fitted with douche, shower, and spray arrangement for connecting to any existing plunge bath at a cost of only a few shillings; thus putting within the reach of the majority a very useful and desirable apparatus that has hitherto been denied to them, on account of its elaborate make and consequently high price.

One of the most attractive stands in the building was that of Mr. Henry Conolly, 53, Hampstead Road and elsewhere, whose exhibit, composed for the most part of interior fittings, embraced a wide range. In a large and tastefully fitted erection was displayed from the roof an extensive collection of Gaseliers, Hall Lanterns, etc., while from the pillars supporting it and adjacent parts a choice assortment of brackets for gas was fixed. Nearly all styles now prevalent were to be found amongst them, those of the 'Queen Anne' and 'Adam' predominating, and amongst the assortment were some noteworthy examples of those styles of fittings. The hall lanterns were equally varied in style, numerous pretty examples of the stained and painted glass, now so popular, being conspicuous. Around the top of the structure, and arranged as a deep raised projecting cornice, were placed panels of stained glass, the patterns shown amounting to something like 100, and embracing all qualities, from the simple small panels in leaded frames to the most costly hand-painted specimens for decorative purposes. Although this class of decoration has only so recently been resuscitated, it is remarkable at what a low price short window blinds, panels, etc., can be produced in it, and we can conceive no prettier style of material for such adjuncts. Turning to the sanitary portion of the exhibit, we noted a variety of Closets, Water-waste Preventers, etc., of improved construction. Amongst the former was a new valve closet with a secret overflow, by which the box underneath the pan is constantly flushed and kept free from sewer gas. As we purpose giving an illustrated description of this as soon as the engravings are ready, we will not here anticipate it. A handsome mounted

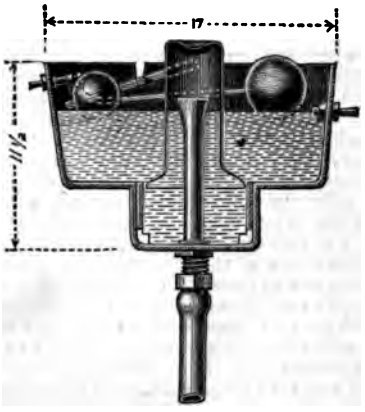
bath, consisting of plunge, shower, needle spray, douche, etc., formed a veritable object of attraction on this stand, and

although not a new invention, to this firm must, we believe, be credited its first introduction many years since. A drawing of this bath is also appended. In lavatories the exhibit was exceedingly strong, and ranged from the most simple for office use to some very 'advanced' specimens for hotels or mansions, all of which, even to the cutting and polishing of the marble, is done at Mr. Conolly's factory. In general plumbing goods, including pumps of various descriptions, hydrants, etc., the display was of an extensive character. One most important feature connected with Mr. Conolly's establishment is the large stock of every article that is kept, which enables extensive orders to be executed without delay, a feature that will not fail to be appreciated at the present day.

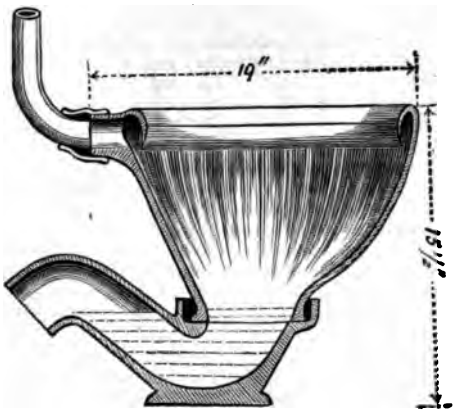
We were glad to see the Universal Deodoriser, recently introduced by Mr. H. Raimes, and noticed in the SANITARY RECORD last month, being shown, thus giving builders and others an opportunity of testing the merits of this useful apparatus.

Messrs. Capper, Sons, and Co., 3, Ingram Court, Fenchurch Street, exhibited Pearson's Patent Trapless Twin Closet made, entirely in one piece, of the best earthenware, with the twin chamber forming a water-supply cistern, in which is fixed the ball-valve. We have given full details of this invention on former occasions. By its side, an india-rubber covered plug and a good water-seal effectually prevent the admission of sewer gas to the house, and when supplemented with Brian Jones's patent joint, which is an admirable and simple means of connecting it with the soil-pipe, the inroads of rats or other vermin are entirely prevented from the drain to the house, as it is impossible for them to obtain access to the cement to disturb the connection. The firm also exhibited specimens of lavatories, sanitary ware and valves, and cocks of various kinds, some being of rather a costly character, and notable for their fine finish.

Another water-waste preventer is that known as Bean's Patent Direct Acting Valveless Waste Preventer, manufactured by Mr. Omer D. Ward, 182, Upper Thames Street, E.C. It has some very striking features, the most important being that which its title signifies, viz., the absence of valves and its direct action; the construction is extremely simple, and there are no tight-fitting parts to get out of order, so that the wear and tear is reduced to a minimum. The accompanying diagram shows it to be



quite different to anything else in the market; and though of comparatively recent invention, it has already been awarded the medal of the Sanitary Institute of Great Britain as a mark of special merit. Mr. Ward also showed a very good closet, of which we append a sketch. It is termed the 'Household' Closet, and has the important feature of combining the simplicity of the Hopper class of closet with the advantages of patent valve closets, as a glance at the sketch will show, provision being made for sufficient water to remain in the bottom of the pan to prevent the soiling of the outlet. The arrangement of the trap and flushing rim is original and very effective. Mr. Ward's experience in sanitary engineering has secured for him several large contracts, and he is now supplying large numbers of manhole doors and other specialities, of which specimens



were exhibited at the stand. A special disconnecting syphon trap, to allow of cleansing drains to sewer, is a great improvement on the ordinary ones, and will no doubt be largely used.

Mr. B. C. Cross, C.E., Victoria Chambers, Dewsbury, exhibited his Patent Self-Acting Latrines. The action of these trough water-closets is at once admirable and simple, yet quite original and very ingenious; differing *in toto* from anything else of the kind hitherto brought before the public. A range of four was shown, fitted complete to cistern, so as to give every facility for testing their merits; and to judge from the number who availed themselves of this opportunity, and the opinions expressed by authorities on such appliances, they would seem to be an undoubted success. We hope to give a fuller and an illustrated description of these latrines in our next number, but in the meantime it may be pointed out that they are entirely self-acting and water-waste preventing, as only a limited quantity of water can be used, and this quantity cannot be altered by the users. Likewise, every time the apparatus works, the whole of the troughs, whether only three or four, or a dozen and upwards, in a range, are thoroughly flushed, and consequently always kept clean and healthy.

Amongst the exhibits that are specially interesting to the readers of the SANITARY RECORD, we are pleased to note that of the Mangotsfield Pennant Stone Company, Staple Hill, Bristol. In the latter city, where scarcely anything else is used for street work, and, in fact, throughout the West of England, the stone quarried by this firm is thoroughly well-known. We will, however, for the benefit of those who may not be so well acquainted with it, point out some of its special features. Pennant stone, then, is of a slatey-blue colour, and particularly hard and durable, but it must not be confounded with that dark stone with which several of our thoroughfares are paved, and which presents a most greasy and slippery surface on damp mornings, or after a slight shower of rain; for, while in point of durability it will almost vie with granite, the foothold upon it is as firm and comfortable as upon many of the softer kinds of stone which do not wear nearly so long. It is, for these reasons, specially adapted for paving, kerbing, crossing, and every description of street work, and very satisfactory testimonials have been received by the Company from the various surveyors and Sanitary Authorities of those cities and towns where it is largely used. It is also applicable for all kinds of building purposes, as, from its colour, it renders house fronts, warehouses, etc., very effective; and to illustrate the wide range of its utility, the firm show specimens of astrical, round, and square nose steps, a pair of pillars showing different styles of workmanship, monumental headstones, and all sizes of kerbs, crossing stones, flags, and bunched and pointed paving for street work, as well as sanded paving suitable for churches and entrance halls, for which latter purposes it takes a by

no means insignificant place amongst its numerous uses; and practically knowing its value, we can recommend it to those who may have not yet tried it.

The neighbourhood of Leeds, it is well known, contains a clay admirably adapted, not only for the ordinary sanitary ware, but for delicately shaped and artistically modelled articles for ornamental purposes; and under the title of Leeds Faïence," Messrs. Wilcox and Co., Burmantofts, Leeds, have placed before the public a most commendable collection, comprising not only slabs and other architectural devices, string courses, etc., but numerous specimens of tiles, etc., for dados and interior decoration. The clay, which is obtained from pits on their own grounds, when first excavated is similar to a grey stone, and has to be ground to a fine powder before mixing. It takes any colour that fancy may dictate, and is said to be capable of bearing a much harder burning than most other clays. In this respect it is remarkable for producing from the kilns very large slabs perfectly flat and level. It is being utilised, amongst other purposes, for the tops and sides of stoves, and wherever there is a danger of tiles of the usual substance becoming loose or falling off. The Leeds faïence is made of the thickness of a brick to guard against it. The designs of most of the subjects are highly artistic, and reproductions of well-known works can be truthfully carried out in this material. Another of the uses to which the firm are adapting it, is for the covering of iron or wood columns; and to obviate the amount of labour where so many small pieces are used for decoration, slabs of from three to four feet are constantly being turned out from the kilns perfectly straight and flat. A fine specimen was shown in the form of a circular ornamental chimney top of considerable height and attractive design. As a producer of sanitary ware the name of Wilcocks is widely known; as manufacturer some of the best samples of most of those appliances were on show. Turning to ornamental vases and all those little appendages in pottery now so extensively in demand, a charming collection was exhibited, including many of a decidedly æsthetic character, from the tiniest and plainest example to the largest vases, with figures and flowers in bold relief, which proved that the Leeds faïence and Messrs. Wilcox's artists are worthy of taking a front place in this class of art work.

No less noticeable were the productions of Messrs. Cliff and Sons, of Wortley, near Leeds, which, broadly speaking, were of a somewhat similar character. This firm is also extensively known as makers of sanitary ware, and hold a high position in the market for this work, the specimens shown being of a decidedly superior character. They also manufacture baths lined with a thick coating of white enamel, which possess the great advantage of being remarkably light in weight. Generally, it is understood that full-sized plunging baths made of pottery weigh about 7 cwt., yet this firm are able to produce them as large in size, and of similar substance, that do not exceed about 4 cwt., a difference that offers advantages not to be overlooked. A variety of slop and other sinks similarly enamelled and offering the same advantages as to weight, were on view, as well as a washing pan of the same material and of specially designed shape to render it most suitable for laundry purposes. This article, we are told, is extensively exported to the United States, and as it is decidedly the best article we have seen for its purpose, from a sanitary point, we are not surprised at our American friends having taken to it. It deserves to be widely known, and we hope Messrs. Cliff will succeed in obtaining as great a patronage for it at home. They also showed some specimens of salt glazed ware for string courses and other exterior uses, which it may be fairly assumed are practically indestructible. In the higher forms of decorative painted and glazed clay work, their exhibits ran over a wide range. Tiles and slabs in all sizes, including amongst the larger ones some very fine masterpieces, were in force, and their ornamental bricks were in many instances gems of art as regards their decoration and colouring. The *chef d'œuvre* in Messrs. Cliff's exhibit was a majolica column some twelve feet high and intended for covering an iron column. The design of this pillar was worked out in a spiral or serpentine form, and was composed mainly of six-inch tiles, between which was entwined a narrow band composed of wreaths of flowers all in bold relief and well formed. This, too, extended from the top to the bottom. When it is considered that each of the tiles and pieces composing this column had to be made of a curved form, and when we add each fitted in its place as if the whole had been made in one, it will be understood what an amount of care must have been bestowed on this production.

Messrs. Robert Boyle and Son, Holborn Viaduct, were well to the front with many specimens of their well known ventilators. The firm have recently made an important reduction in the price of these apparatus, which, we imagine, will materially increase their sale. As we shall shortly have occasion to call attention to Messrs. Boyle's specialities in a more detailed form, in connection with the articles now appearing in the SANITARY RECORD, on the construction of public buildings, we defer further remark until then.

In a tasteful erection, of the summer house character, arranged to show their specimens of stained glass window blinds, painted windows, etc., to the best advantage, were collected the exhibits of Messrs. Hodkinson and Clark, Small Heath, Birmingham. The firm have gained for themselves a considerable amount of commendation for their improvements in shutters and blinds. Their Metallic Venetian Blind is one to which we would draw attention, as possessing many advantages over its wood prototype, and it has, we think, been very aptly termed the 'window blind of the period'. Their 'Queen Anne', which combines both shutter and blind, giving efficient ventilation with security, is one of those inventions of a sanitary character, the advantages of which are comprehended at a glance. It has become a decided favourite, and justly so, partaking of the character of the outside revolving shutters, though in smaller sections; the strips are sufficiently wide apart to ventilate the room, and even admit a little light, and it is drawn down with the greatest ease. Another excellent invention is their Early English Revolving Shutter, intended for ordinary sitting rooms, or buildings in that style of architecture. Rapidly drawn down without disarranging curtains or furniture that may be in front of the window, it has every claim for adoption over the old-fashioned style of shutter and its attendant inconveniences; and the surface, which is formed into blocks with bevelled edges or some similar simple device, is intended for ornamentation, by which means it may be made a medium to add to the decorative features of the apartment, instead of being an unsightly object. On this occasion the firm exhibited also a model of an entirely new shutter or curtain of steel for theatrical use, and devised as a safeguard in case of fire, and for the protection of life and property, and which, we believe, is well adapted to answer the purpose for which it has been patented. It is on the revolving plan, and composed of laths or bars of steel, hung upon patented machinery, by which, by hand power (for the patentees object to motive power for such a purpose) a curtain for the largest theatre in existence can be lowered in the space of *four seconds*. It will project into the brickwork on either side of the proscenium to a depth of six inches; and, as fires more often occur behind, than before the curtain, this will have the means of localising it, and what is, perhaps, of greater importance, of keeping the sight of fire from the audience, and so avoiding a panic, and danger to human life. It is maintained that the steel curtain will arrest the progress of heavy flames from two to three hours; it is therefore fair to assume, that from whichever side a fire originates, this invention is capable of protecting life and property on the other, sufficiently long for all to be removed, or the fire to be extinguished.

The display of locks and door furniture offered for inspection by Messrs. Nettlefold and Sons, High Holborn, left nothing to be desired. It is said, 'Love laughs at locksmiths', but he who happened to be the wrong side of some of the locks exhibited by this firm must be content to remain there, unless some other means of escape presented itself. In prison locks the various combinations of single, double, and even treble bolts, and the arrangement of master keys, which caused the others to be useless after the

'master' had done its work, introduced us to the precautions put in force in such buildings, and the many examples of domestic locks, with their ingenious arrangements to guard against the depredations of servants or the professional housebreaker, would seem to show that if a better description of lock were more in use, burglaries would not be so easily effected. An extensive assortment of door and lock furniture, in all the modern styles, was also shown, and as it is pretty generally known that this firm are the largest manufacturers of screws in the kingdom, every description of this universal article, and others to which a worm or thread is necessary for its fixing, was shown.

An attractive contingent at Messrs. Wells' stand was a *recherché* collection of high-class door furniture, manufactured by Messrs. James Cartland and Sons of Birmingham, and contributed through the courtesy of Mr. Hardy, the representative of the firm in London. There is, probably, no firm connected with this description of manufacture that have done so much as Messrs. Cartland to raise the character of this kind of domestic fittings. Messrs. Cartland have raised this portion of their trade to one of high art, and in place of an incongruous medley, introduce two 'sets' of hall or front-door furniture, consisting of massive knobs, knockers, bell-pulls, and letter-box plates, all modelled *en suite*, and in a variety of colours and styles. Of course at the present day every manufacturer has to study the 'Queen Anne' and 'Adams' style, and we may add that Messrs. Cartland's designers have succeeded in throwing considerable 'spirit' into the sets they have prepared. In this department the palm must, however, be awarded to an elaborate suite, of Egyptian design, in which the sphynx figures conspicuously. There was also a fine collection of massive long door-handles, in which 'art' panels of various designs were introduced in the back-plate. Deposit work such as we have been accustomed to associate mainly with plate has been utilised for the finger-plates and lock furniture of our rooms, and stood prominently forward in all the richness of silver and gilt. Then we were introduced to *repoussée* work in the same appliances, which convinced us that Birmingham workmen are quite able to hold their own against all comers. The last introduction of the firm for this purpose is a collection of enamel on brass suites, some of which were treated conventionally, and in those low-toned colours and neutral tints now so much affected. Others were in the Anglo-Japanese styles, and were characterised by all that quaint irregularity appertaining to Japanese art. It must be conceded that numerous as were the specimens of door furniture to be seen in the exhibition, the collection of Messrs. Cartland and Sons occupied the place of honour.

Messrs. Hayward Brothers and Eckstein, of Union Street, Borough, S.E., made a very interesting display of their well known pavement lights, now indispensable in all large and crowded cities and towns for directing the light into underground apartments and basements. The peculiar and important features of this patent were explained and illustrated in the columns of the SANITARY RECORD a short time ago, and we can only add that the firm took their usual pains to demonstrate their special qualities to any who may not have been acquainted with them, several being fitted at the top of the stand, allowing visitors to walk underneath them and inspect the nature and arrangement of the semi-prismatic lenses. A good assortment of coal plates, both ventilated and fitted with and without lenses was also shown, as well as various kinds of ventilators, including Arnott's and Sheringham's, and all kinds of general builders' castings.

Messrs. Woollams and Co., High Street, Manchester Square, W., showed some fine specimens of wall papers which deserve more than a passing remark. Some of the designs were exceptionally choice, and the contrasts of colour equally charming. There were also some very good samples of embossed leather papers, raised flocks for painting over for wall and ceiling decoration, etc. But the special feature of the goods manufactured by this firm is, as has been frequently mentioned in our columns, the fact that they are free from arsenic or any other injurious pigment.

Amongst the sanitary paints exhibited, the Albissima Paint Company were prominent. This splendid pigment is rapidly increasing in public estimation, and a few of the public buildings to which it has been applied are the House of Commons, South Kensington Museum, Marlborough House, Highgate Infirmary, and the General Hospital at Bristol.

One of the few paints in use that can claim to be absolutely non-poisonous, it presents features of an hygienic or sanitary character, worthy of the most universal consideration. Perfectly innocuous in itself, it can be mixed with other colours equally non-poisonous, and the most delicate tints can be obtained, particularly those neutral tints that are at present so much in used. Its covering power is considerably greater than white lead paints, it works much freer under the brush, and is proof against the insidious advances of gas and impure atmospheres, and while protecting metallic surfaces, does not attack them. For the most delicate traceries in artistic work it is far preferable to white lead, and it is decidedly better for outdoor work in the hottest seaside resorts against the influence of the sun. Another great recommendation is, that persons may live in their houses while repainting is being carried on without the slightest discomfort as regards smell, and perfect freedom from injury to health, no small advantage to the thousands who have to remain at home while this work is being carried on.

Another paint exhibited, and having equal claims upon our attention from the same point of view, was that of the Sanitary Paint Company (Messrs. Griffiths, Berdoe, and Co.), South John Street, Liverpool. This, too, is of a perfectly innocuous character, the groundwork being composed of Griffiths' patent white, which has gained considerable notoriety. It is an opinion with many, though an erroneous one, that some of the brighter colours cannot be obtained by using the patent white with other pigments, but, in the case of the sanitary paints, every colour produced, even the emerald greens, are warranted to be entirely free from arsenic and other poisonous compounds, and the body and gloss they are capable of effecting is far in advance of that of the old paints. This paint must not be confused with the ordinary zinc paints, from which it differs materially, as, for instance, it is well known that in large towns or vitiated atmospheres, under the influence of the gases evolved, white lead paint becomes black, and even the common zinc paints fall a prey to their action, but the patent white remains unaffected. It bears the greatest heat without blistering, and always retains its opacity, never becoming transparent. It has been fortunate, amongst other medals and awards, to obtain the special gold medal of the Sanitary Institute of Great Britain, as 'an exhibit of pre-eminent merit'. For buildings much exposed to injurious influences, a special quality is prepared, called 'Silicate' paint, which possesses all the advantages of the other, but is prepared with a particular kind of silica, imparting to it extreme hardness. Another excellent preparation of the Company is a silicate distemper, a non-poisonous water paint in all colours, which forms an effective substitute for wall papers, as any designs may be painted on the ground colour, and it has the important advantage of being washable, which recommends it strongly from a sanitary point, and for hospitals, prisons, etc. It may be added that, if used as a ground colour only, its application is most simple, as it is mixed with water instead of oil, and applied as whitewash. A petrifying liquid, also free from all poisonous compounds, is another preparation manufactured by the Company, and for the purposes for which it is intended is a no less effective agent. This mixture is intended for damp walls, or any place from which it is desired to exclude damp or moisture. Examples shown by the Company by means of porous vessels filled with water, with and without a coating of this liquid, demonstrate that it is a singularly powerful medium for its purpose, and should prove a cheap and effective means of eradicating that destructive nuisance from our buildings.

Mr. Ellison, Victoria Square, Leeds, was present with his excellent ventilators, which efficiently provide ventilation without draught.

The Silicate Paint Co. (J. B. Orr and Co.), 46, Cannon Street, E.C., and Charlton, Kent, exhibited the various specialities for which they have justly become celebrated, comprising Charlton Silicate Paints, Enamels, Varnishes, Incombustible Paint, and the important pigments inseparably associated with this firm, viz., 'Charlton White' and 'Duresco'. The former, as an oil paint, is now generally admitted to be superior to white lead, both for possessing more body, and for its capability of covering a larger surface with a denser coating, while a point of equal importance, particularly to our readers, is its non-poisonous nature. The foregoing remarks are equally applicable to 'Duresco', and amongst its other qualities it possesses may be mentioned its economy, and the feature possessed by no other distemper, viz., that it can be washed when soiled. To demonstrate the practical effect of Messrs. Orr and Co.'s paints to those who may not be acquainted with them, several very artistically decorated panels, executed in various colours, were shown. These were sent in for competition for the prizes offered by the Journal of Decorative Art to the three great divisions of the house-painting trade, and to which Messrs. Orr and Co. liberally and generously contributed, in common with Messrs. Wilkinson, Heywood, and Clark, the well known varnish manufacturers, who also exhibited their many specialities.

The Indestructible Paint Company (Limited), Cannon Street, E.C., specially noted for their patent stone solution, exhibited a variety of articles, consisting of different kinds of stone, bricks, tiles, etc., each in duplicate, those coated with the solution showing its celebrated properties of rendering them thoroughly impervious to moisture or chemical action. Many public monuments have been with great advantage coated with this solution, and the Metropolitan Board of Works adopted it for coating Cleopatra's Needle, thus showing its excellent qualities.

Mr. R. Adams, Great Dover Street, S.E., who is 'at home' at this class of Exhibitions, had an attractive stand, in which were collected the many specialities that emanate from his workshops. Whether looked at from a point of safety to property or life, or from an hygienic phase, these articles are equally commendable. One of Mr. Adams' most useful inventions is his Patent Fanlight Opener and his Patent Window Sash, enabling top or bottom sashes to be turned over, or swung, and cleaned in the room, thus obviating the dangerous expedient of servants sitting outside for cleaning, is fast increasing in sale, while the 'Toby' Cord Holder, the Secure Sash Fastener, the Improved Espagnolette Bolt, that locks as well as bolts, and his many patent locks, are all excellent in their way, and improvements on many of the older appliances.

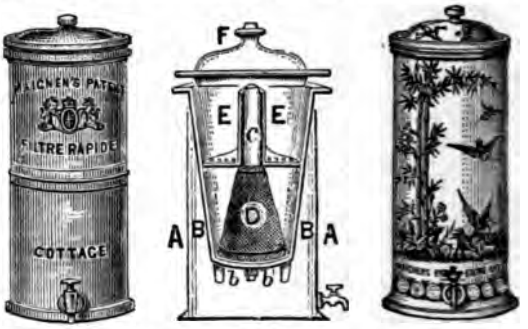
The Sanitary Engineering and Ventilating Company, 115, Victoria Street, Westminster, were present with their various specialities, to which we have called attention on previous occasions. The newest feature in their exhibit was the 'Æolus', or water spray ventilator, capable of discharging a constant current of purified and cooled air to the extent of 10,000 cubic feet per hour, and under entire control, into any apartment. By means of a gas burner, the the temperature of the incoming air can be raised in cold weather to any required degree. We shall probably describe and figure this apparatus in a future number.

Mr. W. Peck Taylor, Wood Green, Tottenham, whose invention, connected with the curing of smoky chimnies and consumption of smoke, we described at length in our report of the Smoke Abatement Exhibition, embraced the opportunity afforded by this Exhibition to again introduce his system. Mr. Taylor informs us, that since we adverted to it, he has received numerous applications and orders to construct his arrangement, which, as we before observed, is of a simple, inexpensive, and effective character.

Messrs. Henry Tylor and Son, East Road, City Road, the oldest firm of Metallic Bedstead Manufacturers in the Metropolis, contributed several specimens of high class brass bedsteads of their make, notable for excellent workmanship and solidity. The firm are also extensive makers of venetian and all other descriptions of blinds, and hold a patent for an improved action for venetian blinds, enabling them to be raised or lowered to any position without the assistance of hooks or supports, and which they attach to them without extra charge. They also exhibited a selection of wooden coal boxes of their own make of very good design.

Messrs. Charles Drake and Co. (Limited), Railway Wharf, Battersea Park, S.W., made an excellent display of their Patent Marble Concrete, comprising coloured concrete window heads, copings, etc., dove-tailed self-fixing building slabs, mosaic marble concrete jointless pavements, concrete steps, floor tiles, fire-proof floors, staircases and doors, polished marble concrete baths, chimney pieces, pedestals, fender curbs, and facing bricks. From the close resemblance of this material to natural granite, both as regards appearance, hardness, and durability, it is becoming very popular. Messrs. Drake and Co. also showed a model of their concrete building apparatus, which is applicable for all sizes and classes of buildings, and is undoubtedly superior to anything we have seen for this purpose. Several photographs of buildings erected by them with this apparatus were shown at the stand, exemplifying its importance, and forming an interesting feature of the exhibit.

Though not connected with building appliances, but, nevertheless, fulfilling a most important function for the benefit of all, Maignen's 'Filtre Rapide' was purifying water 'from morn till dewy eve' by the simple process of the inventor. We have had occasion to speak of M. Maignen's Filter on several occasions. Invented originally for filtering wines and spirits, it occurred to M. Maignen that, by altering the filtering medium, he could purify water upon the same principle. But the shape of the filter he was using for the original purpose, though adaptable for large bodies of water, or even for house supply when attached to the main, was not suitable for an independent filter, such as is commonly used, and although the inventor was not an advocate for the storage of water after filtration, he found that it was only the few that would adopt a filter to be attached to the main supply, and if he was to utilise his invention to the fullest extent that its valuable points and simplicity deserved, he must prepare others in conformity with the orthodox pattern, and with at least a small chamber for storage. After many experiments, he has, at length, succeeded in perfecting his arrangements;



and at this exhibition his domestic filters were shown for the first time in public in a complete form. The accompanying illustrations represent a sectional view of the interior—one made of a cheap stoneware, which he terms a 'cottage' filter, and another, in ornamented white earthenware, for those who prefer a more elaborate article. In the sectional view, A is the reservoir for the filtered water; B, the filter-case proper, which is removable; C, is the air-pipe of the filtering-frame—a hollow and perforated cone with outlet *bb*; D, is a specially woven asbestos cloth, which, as is well known, is indestructible even by fire. On the outside of this cloth a layer of finely-powdered filtering medium—Maignen's Patent 'Carbo-Calcis'—is automatically deposited, by being mixed with the first water put into the filter, as shown in the illustrated directions. It is this layer of 'Carbo-Calcis' which is said to arrest the impurities, soluble and insoluble, contained in the water. E is a screen for protecting the filtering medium; and F is a cover. The air-pipe has a small cup in which cotton-

wool is placed. By this means a current of purified air is constantly being supplied to the water, the effect of which is to aërate it, and it is drawn off, not only clear and bright, but in a sparkling state, unlike the conditions of any other filter. It will be observed that all the parts are loose, and can consequently be kept clean, as any other domestic utensil, and the asbestos cloth can be washed and cleaned of the filtering medium at any time. So far we have only discussed the features of M. Maignen's domestic or 'Bijou' filters as he has named them; and as the treatment of large bodies of water by his system has been thoroughly discussed in the SANITARY RECORD on previous occasions, it is unnecessary to revert to it again, except to say, that he is prepared to take in hand the filtering of a town's supply with far less room and at infinitely less cost than any mode of purification that has yet been attempted. His patented medium 'Carbo-Calcis' is inexpensive, and it does not follow that when the asbestos cup is being cleansed that the whole must be lost, as it may be retained, washed, dried, and baked, and be used again and again.

A collection of folding chairs, intended either for the invalid or convalescent, some of which were adaptable either as bed, couch, or chair, were exhibited by Messrs. Burnby and Co., Key Hill Drive, Birmingham. Two important points were noticeable in these appliances, viz., their very moderate price, placing them within the reach of a large section of the community to whom the cost of most invalid furniture has hitherto presented an almost insuperable barrier, and the simple and easy manner in which the positions are changed, which may be done by the user, unless a confirmed invalid, in most cases without raising from the position in which he or she may be reclining; however, as we purpose on a future occasion giving illustrations of this invention, we shall defer further remarks.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BELPER RURAL.—But little real improvement seems to have been made as regards sanitary matters in this district during the past year. In his report on the Alfreton district, Mr. Edward Gaylor records with gratification that the death-rate for the year (14.59) is a very favourable one, and equal to any of the healthiest rural districts in the kingdom which has in its population mining and manufacturing industries, as well as agricultural. In the parish of Alfreton, the sewerage scheme seems still in abeyance, the absence of any good plan for its disposal being assigned as the cause. It is satisfactory to learn, however, that a system of water-supply for the place is approaching completion, and that building bye-laws are in force in this parish. There is an absence of good water at Coich, but in other portions of the district some amendment has been made in this important respect. Of the total deaths registered during the year in Mr. Gaylor's district (273), 15 were due to zymotic causes. This number, however, does not include diarrhœal deaths, to which 14 deaths were ascribed. Mr. J. Allen, who has charge of the Belper District, prefaces his report with a statement of the improvements effected since his appointment as Health Officer. 'Many parts of my district,' he observes, 'indeed, I may almost say, the whole of my district, was in a very unsanitary state, when the three main factors for the preservation of life and health are considered, viz., good drainage, a plentiful and pure supply of water, and efficient ventilation.' With respect to the first of these, he adds, 'There was hardly a sewer in the rural part of the district worthy of the name. In some parts, the water-supply has been improved, but it is, on the whole, in a very unsatisfactory condition, the inhabitants depending generally on shallow dip-wells and cisterns of rain water for their daily need.' Some improvements have also been made in drainage arrangements, but, as Mr. Allen rightly points out, very much still remains to be done. Amongst an estimated population of 17,086 persons, there were 557 births and 279 deaths in the Belper District last year. Of these deaths, 88 were of children under five years of age. Thirty-six deaths are due to zymotic diseases, scarlet-fever causing 10; diarrhœa, 10; measles, 5; and whooping-cough, 2. Mr. Allen urges upon his authority the pressing need of accommodation for the isolation of cases of infectious disease, as well as of proper disinfecting apparatus; and he advocates the establishment of a system for the compulsory notification of infectious disease.

BINGHAM RURAL.—It is unfortunate that Mr. Poyntz Wright has ceased to be Officer of Health for this district, since his reports show him to have taken great interest in his work, and to have been anxious to secure sanitary improvements. He has remarks in his report for 1880 on a variety of general subjects, such as the feeding of infants, the certification of deaths, the isolation of infectious cases, the compulsory notification of diseases, and the tenure of sanitary medical appointments, which are sensible and to the point. The water-supply of the district has been difficult to improve, in consequence of the geological strata of the locality; but it seems that the question is mainly one of expense. Seeing the number of cases of typhoid fever that were recognised even during last year as due to the drinking of polluted water, it is manifest that the present state of affairs cannot be allowed to continue. The death-rate is given by Mr. Wright as 19.91 per 1,000, or an excess over that for 1879. Diseases of the respiratory organs were responsible for 49 out of a total of 292 deaths, heart-disease for 32, phthisis for 21, and zymotic diseases for 39.

BOLTON.—Mr. Sargeant's last report, which is for the five quarters ended the 31st December 1880, is one of general excellence, though it is chiefly statistical in character. Numerous improvements have been effected in Bolton under Mr. Sargeant's able guidance, but the midden system still exists, and causes not only considerable nuisance, but is in itself a positive danger to health. It is, however, hoped that before long the middens of the borough will be replaced by a new ash-closet on the Bolton system, which, as the Health Officer explains, in addition to being more economical and cleanly, allows the frequent removal of the excrement from the vicinity of the dwellings. The present system of refuse removal threatens to become one of serious import if the "tip" system is allowed to continue, but it is satisfactory to learn that arrangements are being made to supersede this unwholesome method. Amongst an estimated population of 106,700 souls, there were 4,644 births and 2,835 deaths in 1880, thus shewing a natural increase to the population of 1,809. The death-rate is returned at 20.58 per 1,000, or the lowest rate ever recorded for Bolton, being 0.62 per 1,000 lower than that for 1879, and nearly 5 per 1,000 below the average for the preceding ten years. The deaths from zymotic causes are, however, exceptionally large. During the fifteen months under notice, there were 692 deaths, equal to 24 4 per cent. of the entire mortality, and 4.5 per 1,000 of the population. As compared with 1879, the zymotic death-rate was more than doubled, and was considerably in excess of the average rate for the preceding ten years. Measles were very prevalent, being credited with 216 deaths. Scarlatina came next in fatality, with 112 deaths. Whooping-cough terminated fatally in 89 cases, and typhoid fever in 23. Referring to the mortality occasioned by this last disease, Mr. Sargeant again calls attention to a large amount of rubble drainage which exists in certain parts of the borough, and to the imperfect ventilation of the sewers. The Health Officer reports that the compulsory notification of infectious disease continues to give every satisfaction, and to prove of immense value in limiting the spread of contagion.

BURY ST. EDMUNDS.—The third report of Mr. F. Winter Clarke maintains the high character of his two previous reports for interest and completeness. The death-rate in 1880 was less than that of 1879, as well as less than the average. 'This comparison speaks well for the increased healthiness of the town, and for the beneficial

results of improved sanitation, when the fact is borne in mind that Bury doubtless contained more inhabitants in 1880 than in any previous year.' The infantile mortality was unduly high (184 per 1,000 births), but Mr. Clarke thinks this was an accident. Zymotic diseases shewed an increase over the mortality of 1879, but this was due to the unusual prevalence of infantile diarrhœa. A variety of cases of typhoid fever were recorded, particularly in the fourth quarter of the year. The Health Officer has, unhappily, the same dismal tale to tell of the unwholesome and objectionable dwellings for the poor that still exist in such large numbers in the courts and back streets of the town. A clearance of some of these ought certainly to be made without delay. The removal of refuse has now been contracted for by the Town Council, and, as a consequence, 'the overflowing ash-bins and disgraceful accumulations of the past have vanished'. But the authority does not seem to have undertaken the removal of excremental refuse as well, which, in a town like Bury St. Edmunds, is immeasurably more important. Much of the drinking water of the town is still derived from wells sunk in proximity to privies, and it would be well if greater activity were used in securing the substitution of the town's water. The contemplated extension of the waterworks will, perhaps, afford a convenient opportunity for pressing this upon the Authority's attention.

CAMBRIDGE.—Dr. Anningson opens his report with an interesting statement of facts connected with the mortality from infantile diarrhœa and its causation; but nothing very definite has come out of his researches, except an apparent connexion between the prevalence of disease and sewer-air. Whooping-cough is credited with a large number of deaths, but there was a diminution in the mortality from consumption and inflammatory diseases of the respiratory organs. Of the total deaths (572) zymotic diseases caused 119, constitutional 118, local 225, developmental 93; the general death-rate being equal to 16.4 per 1000, which is the lowest reported for the last five years. The revision of the bye-laws (especially as regards new buildings) on the lines of the model issued by the Central Board is a matter that needs the attention of the Commissioners without longer delay. The provision of a public abattoir is another matter of serious importance. The report of the current work done by the sanitary inspector indicates that the sanitary condition of the town is well looked after, whilst a new scheme for scavenging the district is a matter of congratulation. The comparative statistics appended to the report are, as Dr. Anningson explains, practically valueless, owing to the discrepancy existing in the boundaries of the district.

DERBY.—Mr. Iliffe's report is remarkable chiefly for its able and deeply interesting sketch of the working of the compulsory registration of infectious diseases clause in the Derby Improvement Act of 1879. The health officer speaks of its working in the highest terms of approval, and says that it has succeeded in diminishing the number of illnesses, as well as the total number of deaths from fever, and that through its operation many insanitary defects in drainage, water-supply, and the removal of refuse, were brought to light, which otherwise might have escaped notice. The borough is still without a proper infectious hospital, and another appeal is made to the Town Council for its provision. The total births were 3,045, of which 99 were illegitimate, and the total deaths 1,614, being 373 below that of 1879. The death-rate for the whole borough, based on a population of 80,385, was 20.00 per 1000, against an average of 22.00 for the preceding three years. To the principal zymotic diseases 233 deaths are attributed, measles being responsible for 49, scarlet fever for 43, fevers for 34, and diarrhœa for 98. Of the deaths from diarrhœa, 86 occurred in the third quarter of the year, and 73 in children under five years of age. The great majority of these children were hand-fed on a mixture of mother's milk and other food. The sanitary administration of the borough seems very unequal, substantial progress being recorded in some departments, whereas in others the work seems almost at a standstill.

DUBLIN.—Dr. Cameron presents a bulky report, containing the sanitary history of Dublin for the past year. He deals, not only with the ordinary matters connected with his district, but enlarges upon such subjects as 'Social Life amongst the Poor', 'Erection of Dwellings for the Labouring Classes', 'The Expenses of Sanitary Improvements', 'Co-operate Building Societies', 'Imperfect Clothing of Children', and the like. Although Dublin possesses an excellent system of street sewers, the house drainage is very defective. In many of the finest houses in the best quarter of the city, old-fashioned drains still exist, the trapping arrangements are defective, and sometimes altogether wanting. An enquiry by the Health Officer into a nuisance produced by street ventilators led him to the conclusion that their utility is unquestionable, though he adds that 'so far as Dublin is concerned, they do not appear to subserve—except to a trifling extent—the purpose for which they were made. Yet they are serviceable. In the first place, the air which enters them into the sewers helps to oxydise the sewage matter. Secondly, if the air is sucked into houses owing to defective trapping, it is better that it should be largely composed of the air of the street drawn in through the nearest ventilating opening rather than be wholly made up of the gases and vapours of the sewers.' Dr. Cameron's inquiries shew a melancholy state of things in reference to a large proportion of the house drains of Dublin. The condition of the privies and ash-pits in most of the tenemental dwellings is also most deplorable. Improvement, however, is being made in this respect, as during 1880 743 water-closets were put up in these dwellings, mostly as a substitute for privies, and further advancement may be expected, since it is hoped that within two or three years very few of the 10,000 tenemental dwellings in Dublin will be unprovided with water-closets and proper ash-pits. Improvement is also anticipated in the scavenging arrangements, the Corporation themselves having at last promised to take the matter in hand. The appointment of two inspectors under the Dairies, Cow-sheds, and Milk Shop Acts has tended greatly to the amelioration of the dairy yards within the municipality. The death-rate for 1880 was again excessively high. Amongst a population of some 333,401 persons, there were 9,271 deaths, equal to a rate of 35.0 per 1,000, being a slight decrease as compared with 1879, when the rate reached 35.7. This high mortality was largely due to the prevalence of zymotic diseases. Small-pox, though not so fatal as in 1879, carried off 244 victims, while measles, whooping-cough, scarlet fever, and diarrhœa were unusually prevalent. The deaths from zymotic diseases represented alone 9.28 per 1,000 of the total deaths. At some pains, Dr. Cameron endeavours to shew the chief causes of this high death-rate. He holds it to be chiefly due to the existing sanitary conditions, though he thinks that the prevalence of intemperate and filthy habits amongst the masses of the people must also be held responsible.

GUILDFORD RURAL DISTRICT.—Last year this district, which had previously been officered, for health purposes, by the poor-law medical officers acting for their several divisions, was, at the suggestion of the Local Government Board, placed under the charge of one Medical Officer of Health devoting his whole time to the duties of his office. Mr. Joseph Smith was appointed as Health Officer under this arrangement in March of last year, and now submits a report which, as it is only for nine months, is 'not of that elaborate nature which it would have been' had he held office longer. Mr. Smith would have done well to have started his series of reports with a description of the various sanitary circumstances of the district as they at present exist; but this may perhaps be looked for in the next report. The Health Officer has no great schemes of improvement to chronicle, but he seems to have done much unpretending work in the removal of insanitary conditions. The birth- and death-rates of the district are given as 29.8 and 12.42 per 1000, the Guildford district being, as is well known, included in the Registrar-General's group of healthy rural districts. Zymotic diseases caused 22 out of a total of 511 deaths, the largest number of deaths (8) being from whooping-cough. The most pressing need of the district seems to be a more wholesome supply of drinking-water. 'It is common to find cesspools in close proximity to wells,

drains running a few feet, or even inches, from the supply, when a little expense, or rather sense, in the first place, would remedy such a dangerous state of things.' Mr. Smith refers at some length to the spread of diphtheria, which, in common with other Health Officers, he thinks is influenced by dampness of site. His remarks generally on the circumstances under which infectious disease appeared in his district are sensible and to the point.

REVIEWS.

Handbook of House Sanitation, etc. By EARDLEY F. BAILEY-DENTON, C.E. London: E. and F. N. Spon. 1882.

THIS is a reprint of those portions of Mr. Bailey-Denton's lectures on Sanitary Engineering given before the School of Military Engineering at Chatham, and, in fact, is a complete extract therefrom of all that related to dwellings. His son, the author, has, however, greatly enlarged the matter, as well as revised it, and brought it up to the level of present knowledge.

The work is divided into two parts—air and water. The first gives the chemical and physical considerations of air, the best site for dwellings, and the matters which ought to rule their construction. In this portion of the work are also considered external and internal sewerage arrangements, and, lastly, ventilation, from every necessary point of view. We have no wish to find fault with our author, but he would have done well to have added a third part and headed it Sewerage, as it is somewhat incongruous to see the treatment of sewage and the necessary appliances outside and inside the house, find a place between architecture and ventilation, and all contained in a section of the work headed Air.

We have however nothing but praise for this work, which is full of the soundest information, excellently illustrated, and well printed and indexed; and we hope it will have a large sale. It is worth being constituted a text-book, and if a few errors were eliminated, which will readily be discovered by an experienced person—and we are sure this will be done ere a second edition is issued—we do not know a more useful book upon the subject of which it treats.

We particularly draw attention to the chapters upon water, which we consider the best in the book. All the most necessary information upon this most important subject is here massed together. The motive power for raising water is very graphically described, and the various machines for compassing the raising are explained and illustrated in the best manner. The two chapters on Storage and Filtration inside the house, and upon distribution generally, are also executed in a masterly manner.

The author says at the end of his preface, 'An important object to remember in sanitation is the aptitude of all persons to run to extremes of prevention and remedy whenever their minds are aroused to personal danger'. This is most true, and we are glad that Mr. Bailey-Denton has not in any way fostered this facility of running into extremes by the use of any of those frightening and alarming words. He does not speak of 'pythogenic poison', 'sewer effluvium', or 'mephitic gases'; and we bless him for it. For of all learned trash, which, although trash, still means something, the ridiculous verbiage used in some reports and specifications we have seen, sit 'in pride of place'. And to have a work put into one's hand, that anyone can understand without trouble, is indeed a boon.

Wholesome Houses. By E. G. BANNER. London: E. Stanford. 1882.

THIS is a new edition of a former pamphlet setting forth the views of the author upon the subject of domestic drainage and ventilation. The letterpress has been largely added to, as has also the woodcut department, and an altogether new chapter is now furnished upon the ventilation of rooms and railway-carriages. There is nothing particularly novel in the chapter relating to house drainage, as nearly all of it has been given in a former edition; but there are scattered here and there many new observations by the author, and many added quotations, which render the work very useful reading. It is well worthy a perusal by all who seek to render their houses wholesome and free from smells, due to inefficient drainage and want of inlet and outlet ventilation to both soil-pipes and rooms generally.

Our pages have always been open to the discussion of the question as to whether Mr. Banner was the originator of the system of inlets of fresh air into, for instance, soil-pipes; and the matter has been extensively argued, also, in most of the periodicals which take notice of sanitary arrangements. Mr. Banner's claims are very well set forth, especially in the Appendix; and such independent testimony as he has brought together is very telling in his favour.

The author's case is well argued out in this book, which demands a careful perusal of every chapter, and we strongly recommend it to the consideration of our readers.

A Systematic Handbook of Volumetric Analysis. By FRANCIS SUTTON, F.C.S., F.I.C., etc. Fourth Edition. London: J. and A. Churchill. 1882.

THE previous editions of Mr. Sutton's Text-Book on Volumetric Analysis have already secured for this work the approbation of scientific chemists, especially of those who are engaged in instructing students in the principles and methods necessary to fit them for conducting original research. The fourth Edition will be welcomed by all, embodying, as it does, the results of the most recent investigations and the most careful and accurate work of men labouring in a department of science in which, as Mr. Sutton points out in his prefatory remarks on 'General Principles,' accuracy is the greatest of all essentials.

There is an excellent table of contents at the commencement of the book, subdividing it into seven parts. Part I will be found of great value to beginners and learners of volumetric analysis, being devoted to a description of the various instruments and apparatus employed in the work, and a lucid explanation of their uses, and the manipulations required to apply them. Part II gives a very full description of the subject of alkalimetry, including a complete list of the various indicators or colouring matters now in use in the process, and of their properties and behaviour with alkalies and acids. Part III describes various processes of analysis by oxidation and reduction, whilst Part IV deals with those processes in which the termination of the reaction is known by the cessation of the appearance of a precipitate in the liquid under analysis. Part V is devoted to a description of special processes for the analysis of the commonest and most important elements and their compounds by volumetric methods, designed to meet the requirements, not only of original research, but also of chemical manufacturers, photographers, and those engaged in 'commerce, agriculture, and the arts'. But the sanitarian will find most to interest him in Part VI, which, besides an account of volumetric processes for the analysis of urine, soils, and manures, contains a very careful summary of the various processes now in use for the analysis of waters, including the most modern elaborations of Frankland, Wanklyn, Tidy, Bischof, Warington, etc. The VIIth and last Part grapples with the most difficult and delicate, and withal the most accurate, in skilled hands, of all analytical processes, viz., gas analysis.

The handbook, as a whole, may be recommended as lucid in style and complete in detail, and it is printed in good type, and illustrated by good woodcuts.

The Home Secretary has appointed Mr. Robert Collier Driver (of the firm of Messrs. Driver and Co., of Whitehall) the arbitrator in the Great Peter Street, Westminster, Improvement Scheme, under the Artizans' and Labourers' Dwellings Improvement Act, 1879.

Report on the London Water-Supply, presented to the Right Honourable the President of the Local Government Board. By WILLIAM CROOKES, F.R.S., WILLIAM ODLING, M.B., F.R.S., F.R.C.P., and C. MEYMOTT TIDY, M.B., F.C.S., etc. London: Wertheimer, Lea, & Co., London Wall.

THE Report on the Water-supply of London during the year 1881, presented to the President of the Local Government Board by Mr. Crookes and Drs. Odling and Tidy, besides confirming in every respect the Report of the Water-supply Commission, and commending the quality of the London drinking-water as generally good and wholesome, also contains, as might be expected from its source, much that is both original and important.

For instance, a perfectly new and very ingenious method has been employed for observing the exact colour of water as seen through a two-foot tube, or at least a new standard of comparison has been instituted, by means of which slight variations in tint may be read with great accuracy. It is interesting to observe that the period of greatest depth of brownness in the London water, viz., during the months from November to March inclusive, is identical with that during which the aërial brownness, which is the chief bane of life during a London winter—the London fog—also predominates. Another new observation, and one which seems extremely satisfactory, is that the aëration of the waters of the Thames and Lee is almost as perfect as possible. This fact has been arrived at, we understand, by direct determinations of the quantity of dissolved oxygen in the waters of these rivers, and the importance thereof is great, for there seems to be little doubt that the more noxious organic matters in water are more readily oxidised than the comparatively innocuous ones, and in consequence, the presence of abundance of oxygen in solution in any water, argues the absence of easily putrescible (and noxious) organic matter.

In the concluding remarks by the reporters themselves, comparisons are made between the mortality from various diseases in towns supplied by water from rivers and deep wells respectively; the conclusion drawn being that if there is any distinction to be made in favour of either water-supply, the rivers have it. Doubtless the water of deep-wells, especially in chalky soils, is usually very pure, and so far therefore this argument is a strong one in favour of the river waters; doubtless, also, 'alarmists' have made too much outcry about impurities, pollutions, etc. A certain amount of organic matter, as the Water-supply Commissioners pointed out, must always be present in the purest natural water, as in the purest air; and in the absence of any qualitative test for particularly noxious substances, we must at present be content with numerical comparisons of the actual quantities present. No chemical analysis will, however, wholly clear the character of potable water which has been recently polluted with sewage.

On the Action of Water upon Lead-Pipes. Translated from the French of M. BELGRAND, by W. SEDGWICK SAUNDERS, M.D., F.S.A., Medical Officer of Health and Public Analyst for the City of London, etc. (Presented to the Honourable the Commissioners of Sewers.)

DR. W. SEDGWICK SAUNDERS has translated for the Commissioners of Sewers of the City of London, an essay addressed to the said Commissioners by M. Belgrand, Préfet of the Seine, on the action of water upon lead-pipes (Nov. 1881). The translation is prefaced by a few remarks by Dr. Saunders himself. Dr. Saunders points out with perfect accuracy that the 'chemical conclusions, enunciated by M. Belgrand, have been anticipated by a general consensus of scientific opinion' in this country.

Dr. Saunders remarks upon the 'great divergence found in the writings of authors concerning the action of waters containing free carbonic acid upon lead'. Much of this apparent divergence may, however, it seems to us, be explained away, by taking into consideration the quantity of carbonic acid held in solution by the water in the free state. The facts are very simple. Carbonate of lead is insoluble in water, even in pure water, certainly in water containing lime salts in solution; but, like other insoluble carbonates, it is soluble to a considerable extent in water holding an excess of free carbonic acid gas in solution, hence the danger pointed out by Dr. Parkes of allowing mineral and aërated waters surcharged with carbonic acid to remain long in contact with lead. Water, then, which holds in solution but a small amount of free carbonic acid, especially if salts of lime coexist in the solution, produces an insoluble film of carbonate of lead upon the surface of the metal, which will protect the lead beneath from further action; whereas, in the case of waters which are charged with carbonic acid, this film of carbonate of lead will be constantly dissolved off and a fresh one produced, and hence the water will become contaminated with dissolved metal.

Dr. Saunders alludes to the 'well-known cases of poisoning amongst the members of the ex-Royal Family of France at Claremont', and in this connection it will be well to allude to one of his statements, which is perfectly correct in itself, but which might lead to erroneous conclusions and mistaken practice if not clearly explained to the uninitiated. The statement is as follows: 'Water is said to have less effect upon lead when the metal is bright and new, than when it has become tarnished by exposure to the atmosphere, but in either case the action is much more rapid with pure waters than with those containing foreign matters, salts, etc.' This is precisely what we should expect, seeing that the soluble compound of lead which leads to the contamination of pure water which has access to air with the metal is the oxide. Now, lead tarnished by exposure to air would certainly be covered to a great extent with its oxide, probably also with a little carbonate, but it is the presence of oxide upon its surface that would in such a case greatly increase the liability of the water to lead contamination. A careful distinction must, however, be drawn between the tarnishing of lead by exposure to air, and the film of saline matter, usually carbonate and sulphur of lead or carbonate of lime, which forms upon the metal after prolonged exposure to water. It must be distinctly understood that the latter tarnishing is purely protective in its action, and must by no means be removed.

A similar case of lead poisoning to that at Claremont, above alluded to, was probably caused, certainly aggravated, by the mistaken zeal of servants, who polished the leaden cisterns destined to contain the water to be supplied to the French Royal Family, 'till the metal shone like silver'. By this laborious, but most unwise procedure, Nature's safeguard against lead-poisoning was incautiously removed, and a fresh surface of metal brought into actual contact with the water.

It is abundantly proved by M. Belgrand, as indeed would have been expected *à priori*, that water flowing through leaden pipes, especially when the period of contact with the metal is very short, does not exhibit any sign of lead contamination. Indeed, we can readily understand that where cisterns are not in common use, *la guerre au plomb*, must be almost unnecessary. Here, in England, leaden cisterns are the rule, rather than the exception; these cisterns are rarely completely emptied, often only half emptied in the course of twenty-four hours; so that the same water may remain in contact with lead for a very considerable period, only undergoing dilution once in the twenty-four hours when the water is 'turned on at the main'. It is probably owing to the fact that we have in London an intermittent supply of water, that English chemists have so completely studied and mastered the difficulties involved in the 'action of waters upon lead'.

It may be looked upon as sufficiently established that the storage of a particular water in leaden cisterns will be safe or the reverse, according to the nature of the salts it holds in solution. The presence of sulphates and carbonates in solution ensures the absence of lead in solution, since an insoluble film of the corresponding lead-salts will form upon the surface of the metal, and protect it from further action; whilst chlorides and nitrates in quantity

xpose the water containing them to probable conta-
ion, since the chloride and nitrate of lead are both
: in water.

CORRESPONDENCE.

Communications must bear the signature of the writer, not necessarily for publication.]

OOD-POISONING AND BAD DRAINAGE.

: banishment of the Duchess of Connaught from
ot Park, occasioned by causes so clearly described
. William Playfair in his report printed and published
e 17th of March, is a disgrace to the sense and
ation of England. Can nothing be done to impress
dweller in a house, be it a palace or a cottage, that
always breathing living germs of disease if the drain-
' his house is defective? The Prince Consort died of
id fever conveyed through faulty drains. The Prince
ales was brought very near to death's door by the
causes, and now we have a young and Royal mother
ed by the results of bad drainage, leading to puerperal
-an awful fact for future mothers to ponder on! The
: told us last week that the Bishop of Peterborough
ged to quit his palace on account of its unhealthiness.
ırt time ago the late Dean of Westminster died of
poisoning in his house at Westminster—a site to
the boarding-houses of a great school persistently
ıs healthy and profitable to individuals. The Metro-
has spent four millions of pounds sterling to construct
ıin sewers, with which it will be proved some day
ot half the houses in London are connected. Soon
Mr. Gladstone went to live in Harley Street, some
ıouses in that street were found to filter into the soil
and to make no use of the sewers. Within two
past, such palaces as Stafford House and Spencer
, etc., made no proper use of these sewers; and
ive drainage is proved by constant illness in districts
outh Kensington, where houses are leased at rentals
ıdreds of pounds a year. And what is to be said of
ainage of the new Government offices in Whitehall?
: can we look for protection against these germs of
invisible to ordinary mortals, but known to the man
nce? I pray you allow me a little space for a few
tions:—(*a*) Let there be appointed immediately a
Committee of Lords and Commons simply to inquire
ow many houses in London can be proved to be dis-
:ted with the main drainage. It is not an inquiry
: Metropolitan Board of Works, which can only
ister the existing defective law. (*b*) Let the Educa-
epartment, in the fourteen thousand schools under its
ion, direct the managers of them to produce an
te account of the state of the drainage and the venti-
of those schools. Cause the words 'Rules of
,' which are to be found in the new Code, to be
ly understood and practised in all schools, and be
a compulsory subject for instruction. Slow as the
: may be, the remedy against blood-poisoning by bad
ge and imperfect ventilation is only to be obtained
ıe better instruction of the people.

the SANITARY RECORD is aware, I have been
d for the last four months in organising measures of
ion against diseases generated by blood-poisoning,
ope to see a centre of watchfulness established in
arish in the kingdom, by means of which the public
e should do its own work of precaution, and not
public authorities solely. I propose to call these
of watchfulness and sanitary action 'Parish Guilds
lth'; and it is not money, but a common sense of
with benevolence, that is required for the manage-
f them. I have sought for the support of all the
societies existing in the Metropolis, and I have
it from members and officers of the National
Society, the Sanitary Institute of Great Britain,
tary Insurance Association, and the London Sani-
tary Protection Association. The Society of Arts has held conferences since 1876 on the health and sewage of towns, national water-supply, sewage and health in 1879, and on the progress of public health in 1880, and will shortly hold a meeting to discuss these Guilds of Health, and I appeal to the public Press to help on this national movement.

HENRY COLE.

96, Philbeach Gardens, S.W., March 18th.

TREE-PLANTING IN TOWNS.

Having, as your readers are aware, taken some interest, and assisted in the movement of planting Plane trees in London, I shall esteem it a favour if you will give me the opportunity of drawing attention to the importance of intelligent supervision, not only in planting, but in after-treatment.

The severe winter before last may account for dead trees. Some defuncts are, doubtless, due to careless planting,—not nearly a sufficient quantity of suitable soil being placed for the roots—but too many to most culpable and systematic neglect, of which most ludicrous instances could be given. For instance, at Clerkenwell it was lately noticed that the trees were protected by an extemporised stone-yard—stems and branches being smothered by granite cubes, possibly to prevent their being blown away, but this is being 'cruel to be kind', and it might be asked, how is it that some will not grow at the cab-stand, Knightsbridge Green, while others flourish close by. The thirteen vestries who have accepted £100 each will have, soon, to give some account of their stewardship, and the result will doubtless be both interesting and amusing. The late grant of £50 for some twenty trees now planted in the Brompton Road, and which is to be offered to Islington for the bare approach to the Agricultural Hall, was opposed on sanitary and moral grounds, but more strongly, as behoves a 'nation of shop-keepers', from the supposed idea that the trees would hide the shops! I would suggest that when the trees are firmly established we should take example by Paris, that the side branches should be intelligently lopped, which is easily done by nippers reaching twenty feet from the ground, and is especially needed by the trees on the Thames Embankment, which, unfortunately, have been planted too closely together; protection of the stem, too, is needed against friction from swaying in the wind, and sadly too often against wanton mischief, until the trees are able to take care of themselves.

P. HINCKES BIRD.

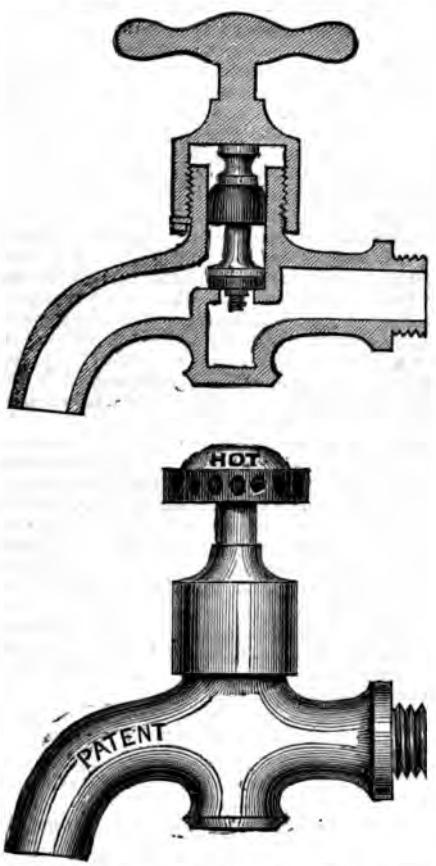
1, Norfolk Square, W.

SANITARY INVENTIONS.

ASHTON AND SPERRYN'S HIGH PRESSURE STEAM OR WATER COCK.

THE accompanying illustrations represent a sectional drawing of a 'bib', and a complete engraving of a bath-cock (Ashton and Sperryn's patent), which has been appropriately named the 'Simple', and is introduced by Messrs. Russell and Co., Limited, the eminent tube manufacturers of Walsall, and brass-founders and gas-fitting manufacturers of Birmingham. Mr. Sperryn, who is the head manager of the several branches of the Company in London, the chief depôt being at 145, Queen Victoria Street, has, in common with all persons who are brought into contact with these articles of universal demand, long seen the disadvantages appertaining to high pressure steam and water cocks, and it must be assumed that the difficulties of simplifying them, and, at the same time, improving them, were apparently so great, that nothing of the kind now offered has hitherto appeared practicable. But, after much thought and experiments, in which he has been aided by his coadjutor Mr. Ashton, the twain have succeeded in perfecting the 'Simple'; and, judging from appearances, and the numerous orders that are being daily received by the Company, it appears likely to supersede all others now in use.

The great aim sought to be attained has been to produce a screw down cock with a less number of parts, impervious to leakage, and that may at all times be taken to pieces by an inexperienced person, should a new cup or washer be required, and that will resist any amount of pressure likely to be brought into contact with it. In this they appear to have succeeded to an almost unqualified extent. The 'Simple' consists of but three loose parts, viz., body, spindle, and top. Thus all the usual appendages of high pressure or screw-down cocks are dispensed with. The spindle has a washer of the required thickness attached to the bottom, and, at a certain distance from the top, an India-rubber cup, specially manufactured to resist the



action of steam or hot water, is fixed. The spindle being inserted, the top is then screwed on, and it is ready for fixing. In use, a great advantage gained is quick action; a half turn, even, brings a good supply of water. The spindle rises, allowing the water to pass freely, and, at the same time, the edges of the cup are expanded, preventing any flow of water upwards to produce leakage, and it is claimed that, by this action, the greater the pressure the sounder the tap becomes, which is the direct opposite of the ordinary cock.

To take it to pieces, only one screw has to be removed; and as a supply of washers and India-rubber cups can be supplied with each one sold, no difficulty should be experienced whenever new ones are required. But the cutting of a washer is such a simple matter, or the making a cup, that given a piece of leather and of India-rubber, the merest novice could prepare and place them in position.

It is not to be supposed that a cock, involving such issues, has been placed upon the market without exhaustive trials, and, we may add, that it has been subjected to the most severe tests, and has come out of the ordeal in a most satisfactory manner. We may further say, that it is applicable to all domestic purposes, and by its use a great amount of trouble and inconvenience will be avoided, and much expense from time to time will be saved.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF COMMONS.

The London Water-Supply.—Mr. Firth asked the President of the Local Government Board whether the reports upon the London water-supply, prepared by Dr. Tidy, Dr. Odling, and Dr. Crookes, and which were circulated as being reports 'presented to the President of the Local Government Board', were prepared with the authority, or at the request, or expense of the Local Government Board.

Mr. Dodson.—These reports are not prepared with the authority, or at the request, or expense of the Local Government Board. They are prepared at the request of the water companies, and it is voluntary on their part to provide them, and they bear the expense.

Coffee and Chicory.—Sir E. Lechmere asked the President of the Board of Trade whether the Treasury Minute of the 20th of January 1882, by which the importation under a duty of twopence a pound of 'coffee or chicory, roasted and ground, mixed, without reference to the proportion of the mixture, and the permission to extend to any other vegetable matter applicable to the uses of chicory or coffee', was made upon the recommendation of the Board of Trade; and if so, whether he would explain the reasons for such a recommendation, which appeared to be in contradiction to the Adulteration of Food Acts.

Mr. Chamberlain explained that the change in the Treasury regulations did not make any alteration in the laws relating to adulteration, and did not, in his opinion, tend to increase the practice of adulteration. The matter had been brought to his notice in the first instance by tradesmen at Leeds and elsewhere, who complained of the anomaly caused by the new Minute. They informed him that, while both coffee and chicory could be imported separately and mixed, and sold legally as a mixture in this country, they could not be imported if they were mixed abroad. He found, on inquiry, that that arose from the fact that at one time the duties on coffee and chicory were different, and that, in consequence, the two articles had to be imported separately. The change now made only amounted to this, that, whereas coffee and chicory formerly had to be imported separated, they might now be imported ready mixed. The interests of the consumer were protected, not by the Customs regulations, but by the provisions of the laws against adulteration. The Sale of Food and Drugs Act provided that no article of food or drug should be mixed with ingredients injurious to health and so sold, under a penalty of £50, and no article should be sold to the prejudice of the purchaser mixed, unless, at the time of the sale, it was described as a mixture. Thus, if coffee, though mixed with a substance not injurious to health, were sold as pure, and not as a mixture, the offender would be liable to a penalty of £50.

The Sheffield Waterworks Company, in their annual report for 1881, state that after paying 2½ per cent. on the 1st of November last, there remains £37,398 17s. 7d., being the balance of the Company's undivided revenue, out of which they recommend a further dividend of 2½ per cent., making 5 per cent. for the whole year, leaving £31,625 15s. 1d. to be carried to the next account. The income in water-rates has increased for the year by £2,358 18s. 4d., and the Company now supply 62,070 houses.

The Smoke Inspector of Cincinnati, in his first official report to the Mayor, states that he has examined twenty-three different smoke-consuming devices, and the best of them, if used with care, can be depended upon to consume from 75 to 90 per cent. of the smoke produced from soft coal.

LUSTRATED SANITARY PATENTS.

67 (1881.) COMMODES: H. J. HADDAN, FOR W. DANIEL, PENNSYLVANIA, U.S. [6d.]—Fig. 1 is a ver- section, and fig. 2 a plan or top view of an improved node. This form of garbage sink and commode is cially adapted for use at sea-side summer resorts and rge hotels situated in places where there is an insuffi- drainage, as the receptacles are so constructed that mposition of matters contained therein is greatly re- d by reason of the separation of their solid and liquid through the perforations in the inner receptacle. The is also conveniently arranged for removing its contents r by hauling away and emptying the entire sink at , or by withdrawing the inner receptacle B through the C, and emptying its solid contents, while the liquids late through the perforated inner receptacle into the sink, are withdrawn from the latter through the open- , or pumped through the channel *c*, and opening *e* e the same. The contents of the sink may thus be ly removed when required, and be conveyed, after deo- ing, to suitable places for manufacture into fertilising ounds if desired, without unpleasant odours or injury e health. The letter A represents an outer case or re- cle that may be supported upon wheels *a*, *a*, as shown g. 1, so as to be readily moved when desired, being

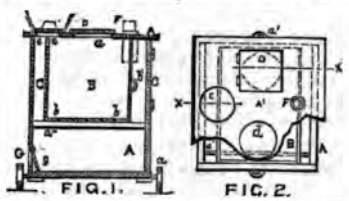
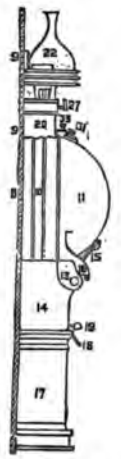


FIG. 1.

FIG. 2.

ded with handles a^1, a^1; or the case may be arranged r ground, as shown in Fig. 2. Within the receptacle support a^{11} for the inner receptacle B, which is pro- with perforations *b*, *b*, at bottom and sides, and has es b^1, b^1, by which it may be removed when desired gh a door C in the side of the outer receptacle. The receptacle B fits closely under the cover A^1 of the receptacle, but is smaller in diameter than the latter, at a sufficient space is left on one side for the handles d on an another side for an opening or vertical chanel ough which the contents of the outer receptacle may moved by means of a pump. The cover A^1 is provided one or more commode openings *d* directly over the receptacle, and closed by lids D. It also has a gar- opening *e* on one side, arranged partly over the inner tacle, and partly over the outer one, so as to commu- with both, said opening being closed by the lids E, E. ntilating pipe F is provided on one side, and at the part of the outer receptacle is an opening G, through the contents of said receptacle may be withdrawn if d, and which opening may be closed by a valve *g*, that nts the escape of such contents until their removal is ed.

3. (1881.) IMPROVEMENTS IN AND CONNECTED LAVATORIES: J. SHANKS, BARRHEAD, RENFREW, [6d.]—The object of this improvement is to save space cabins or state rooms of ships, or elsewhere, where is of consequence. This lavatory is constructed to be against a vertical wall, and is made with an upper for clean water, and with a lower vessel for used . The basin is hinged at a level between the two -vessels, and so that when not in use it can be turned ainst the upper vessel. Some of the present improve- are, however, also applicable with the basin fixed, d of being arranged to turn up. When the basin is ble, a part of the basin piece extends behind the axis ich it turns, and has two passages formed in it, the one being wide and serving for the passage of the ater down into the lower vessel when the basin is turned up, whilst the upper passage is for the supply of clean water to the basin. In some cases the lavatory may be fitted with an external ornamental cupboard, fitted with doors, arranged so as by sliding or otherwise to be quite out of the way when opened. The lavatory is constructed partly of sheet-metal, and so that it can be fixed against a vertical wall 8 by means of lugs 9 formed on it for the purpose. The cistern 10 for clean water is of a circular form,



agreeing with the form of the movable basin 11 when the latter is turned up. The basin 11, with its back part 12, is represented as consisting of an inner earthenware basin, encased in a metal shell. The casing of the basin 11 is hinged by means of lugs and a horizontal spindle 13 to a casting 14, fixed immediately beneath the clean-water cistern 10, and the effect of the weight of the basin 11 when turned down is partly opposed by a wire spring, conveniently coiled upon a spindle, this spring making it easy to turn up the basin. The turning down of the basin 11 is limited by stop projections 16 formed on the basin casing, and small blocks of rubber are fixed in these projections to act as buffers. The receptacle 17 for used water is placed beneath the intermediate casting 14, being constructed with an inward lip at the sides of its upper edge to engage and slide upon projecting flanges formed at the bottoms of the sides of the intermediate casting 14, so that the receptacle can, by means of a handle 18, be drawn away for the purpose of being emptied, whilst a movable fastening 19 is fitted to the intermediate casting 14 to secure the receptacle 17 when in position.

3451. (1881.) IMPROVEMENTS IN REGULATING THE SUPPLY OF WATER, ETC., FOR WATER-CLOSETS: E. LEE AND A. C. MOORE, DEPTFORD, KENT. [6d.]—This is an apparatus for supplying a definite quantity of water from any receptacle, and also acts as a water waste preventer. Fig. 1 shows a vertical section, and Figs. 2 and 3 transverse sections on lines X, X, Y, Y, of one arrangement. A is the discharge-pipe fixed in the bottom of the tank B, the liquid contents of which have to be discharged. The upper end A^1 of this pipe is enlarged to a funnel, and surrounding it is a tube C communicating at bottom with the interior of the tank by means of openings C^1, and arranged so as to present an annular passage D all round the pipe A, extending to slightly above the upper edge of the funnel A^1. Surrounding the tube C is the displacer E, and having fixed to its upper edge an annular shield F extending over the annular passage D and funnel mouth A^1, the central opening of the shield having a downwardly curved lip, as shown. Enclosing the whole of the above parts is the movable hood G, which, when in the lowered position, shown in full lines, rests with its top surface upon the top of the shield F, while its lower end G^1 fits with a central opening round the tube C with freedom to enable it to slide up and down upon the same. To the top of the hood is attached a chain or cord I led over

guide pullies, and by pulling it, the hood can be raised to the dotted position. Assuming the level of the liquid in the tank and inside the hood to be standing at about the line Z, Z, it will be seen that on raising the hood its bottom plate G^1 will, in raising the liquid contained within it, force a portion to pass up the annular space H, and to flow over the shield F into the pipe A. By means of this flow of water, a suction is induced in the annular passage D, causing the liquid to be drawn into it through the openings

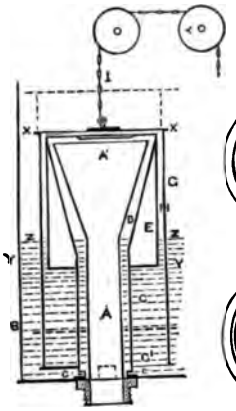


FIG. 1.

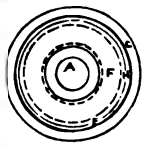


FIG. 2.

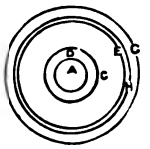
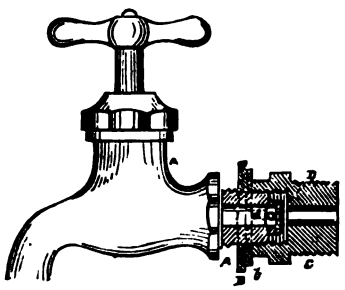


FIG. 3.

c^1, and to be raised up to the top of the pipe A, so as to flow over into the same. The syphon action thus produced will continue until the contents of the tank are discharged. The hood can be allowed to drop again as soon as the syphon action is set up. The greater the depth of the displacer is made, the lower can be the level of the liquid at which it is possible to bring the apparatus into action.

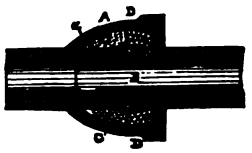
AMERICAN PATENTS.

248,346. Cock and Coupler for Pipes: John Porsch, Jr., Erie, Pa. Filed April 14, 1881. (Model.) Issued Oct. 18, 1881.—*Claim*—1. A stop cock, provided with a cage on the end of its attaching stem, in combination with a coupler, having a contained valve seat, substantially as described. 2. In a cock or faucet connection, or other coupler or joint in pipe or conduits, wherein are



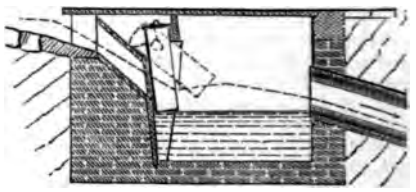
provided means whereby, when the parts thereof are screwed together to the full limit, the opening through the same is closed, the combination therewith of means, substantially as shown, whereby said parts may be locked or fastened when screwed together at any point desired. 3. In a cock or faucet connection, or other coupler or joint in pipes of conduits, the combination, substantially as shown, of the cage D, the seat therefor at the mouth of the orifice at the part C, and the jam nut B.

248,469. Pipe Joint: Charles W. Isbell, New York, N.Y. Filed Nov. 5, 1880. (No model.) Issued Oct. 18, 1881. *Claim.*—The combination of a bell A, having its interior of spherical segmental configuration, the spigot B, having a flange or shoulder A, and the annular bead or projection *b* beyond the external surface of the spigot, the lead packing D locked to the spigot by said



bead or projection *b*, and the oakum packing C, held between said flange or shoulder *a* and said lead packing, substantially as herein described.

248,559. Disinfecting Attachment for Sewers, etc.: James D. Jackson, Washington, D.C., assignor of one-half to Louis Winters, same place. Filed Aug. 25, 1881. (No model.) Issued Oct. 18, 1881.—*Brief.*—The perforated box containing disinfectant material is pivoted



in bearings at the opening of the sewer, forming a valve. *Claim.*—A foraminous receptacle for disinfectant material, pivoted in suitable bearings, and forming a valve for intercepting and absorbing gases in sewers and sewer connections, substantially as described.

248,663. Water-Closet Seat: George R. Moore, Philadelphia, Pa. Filed March 10, 1881. (No model.) Issued Oct. 25, 1881.—*Claim*—1. As a new article of manufacture, a water-closet seat, of wood for its face or upper side, and having a flange upon its under side, bordering around the circumference of the hole in a ring or tubular form, and of sufficient depth to strengthen the seat and to protect its under side from being wet with urine in

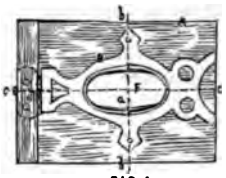


FIG. 1.

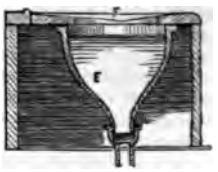
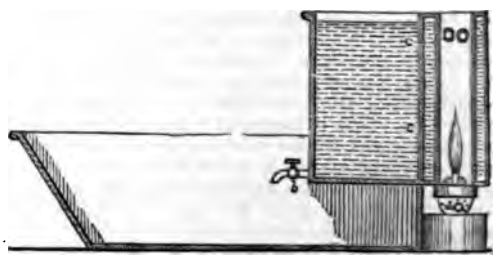


FIG. 2.

its ordinary use. 2. A water-closet seat, having in combination a face or upper side made of wood, a metal frame with a flange bordering round the hole from which radiants *b*, *b*, *c*, *c* extend for strengthening the seat, substantially as and for the purpose herein set forth. 3. A water-closet seat, having in combination a face or upper side of wood, a metal frame beneath it having a flange bordering completely round the hole as a tubular downward extension of the same, which frame extends to and includes a hinge.

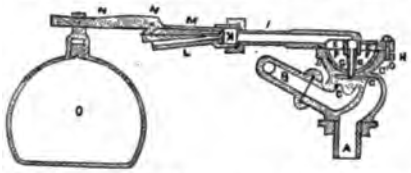
248,790. Portable Combined Bath Tub and



Heater: William Q. Prewitt, Lexington, Ky. Filed Sept. 24, 1881. (No model.) Issued Oct. 25,

-*Claim.*—A portable bath-tub, provided with an d water reservoir at one end, constructed with a eating chamber formed by double walls and a ver- e through the same, which is open at its upper and nds, and is adapted to be heated by a lamp or burner at the lower open end of said flue.

362. AUTOMATIC VALVE FOR WATER-CLOSETS: IEW HOGAN, HARTFORD, CONN., assignor to the rtford Sanitary Plumbing Company, same place. une 13, 1881. (No model.) Issued Nov. 8, 1881.



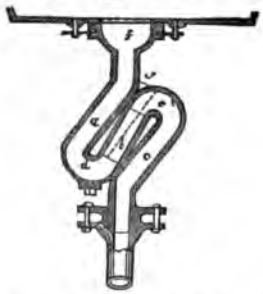
-1. The combination of the valve C, the hollow , provided with the openings J, the cup F, the cup- packing G, and the valve chamber H, provided with haped recess. 2. In an automatic valve, the cup- rubber packing G, secured to the valve stem at the and to the valve-chamber at its rim, in combination id stem and chamber and the cup F. 3. In an tic water cock, the combination of a trip valve K, e main valve, composed of the cup F, packing G, , packing C^1, stem D and guide E^1, said main valve perated by the pressure of the supply water let on sed above the valve by the closing or the opening rip-valve. 4. The combination of the valve K in e L, having the separate discharge pipe L^1, the stem lever N, and the float O, as a device for operating omatic valve mechanism of a water-delivering cock.

114. WASHSTAND AND WATER-CLOSET: JOHN IANSEN, CHICAGO, ILL., assignor to the Chicago, ton, and Quincy Railroad Company, same place. aly 26, 1881. Issued Nov. 1, 1881.—*Claim*—1. A ed lavatory, or washstand and water-closet, the for- ipted to be raised vertically above the latter to a it height to permit of free access to the latter. 2. A ed lavatory, or washstand and water-closet, the being provided with vertical guideways and means ng and holding it at an elevated position as regards er. 3. A combined lavatory, or washstand and

oset, the former being provided with means for it above the latter, and a locking device for locking down, as desired. 4. The combination of a lava- washstand and water-closet, the former being le above the latter in slides or guideways, and ed by a weight and cord, said cord passing over a t a point above said lavatory. 5. The combination atory or washstand, a water-closet, and a bracket et, said bracket or cabinet being a part of the first and both together adjustable above the water-closet.

6. The combination of the wash-bowl I, waste tube H, valve L, and pipe K, the whole arranged in such manner that when the bowl I is raised, the waste tube H is with- drawn and valve L is closed. 7. In combination, the lava- tory or washstand D, basin I, cabinet M and N, cord E, attachment *a*, pulley F, counterbalance weight G, guide- ways S and S^1, pipes H and K, valve L, and closet B, lid C, hinge *c*, cushion Q, and evacuating pipe J.

249,031. WATER-TRAP: WILLIAM J. ENGLISH, COHOES, N.Y. Filed June 3, 1881. Issued Nov. 1, 1881. *Claim*—1. The water-trap consisting of three substantially parallel limbs, *a*, *b*, and *c*, connected by two bends, *d* and *e*, as described, the mouth of the limb *a* and the discharge- opening of the limb *c* being in line with each other, whereby



the trap can be turned at any angle in a vertical plane and a deep seal still be preserved. 2. The water-trap consisting of the three substantially parallel limbs, *a*, *b*, and *c*, communicating through two bends, *d* and *e*, the limb *b* being interposed between the limbs *a* and *c*, and formed with a laterally-projecting side enlargement *h*.

APPOINTMENTS UNDER THE PUBLIC HEALTH ACT.

MEDICAL OFFICERS OF HEALTH.

CAPE, Joseph Thomas, M.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Totnes Rural Sanitary District, at £100 for one year.

EVANS, George Moule, M.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Bridport Urban Sanitary District, at £40 per annum.

GODFREY, Charles Walter, M.R.C.S.Eng., L.S.A.Lond., has been appointed Medical Officer for the Howden Rural Sanitary District, at £80 per annum for two years.

HARRISON, Dr. G. P., has been appointed Medical Officer of Health for Pontefract, *vice* Dr. Grimwood, resigned. There were only two candidates for the vacancy.

HICKS, Edward Buller, L.R.C.P.Lond., M.R.C.S.Eng., has been re-appointed Medical Officer of Health for the Easingwold Rural Sanitary District, Yorkshire, at £40 for one year.

KELLY, Michael Francis, L.F.S.L.Glasg., L.A.H.Dub., has been appointed Medical Officer of Health for the Felling Urban Sanitary District, Co. Durham, *vice* Brecknell, resigned.

MACKAY, James, L.R.C.P.Edin., L.R.C.S.Edin., has been re-appointed Medical Officer of Health for the Berwick-upon-Tweed Rural Sanitary District, at £70, for one year.

PRETTY, George Willson, M.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Hoxne Rural Sanitary District, at £60 for one year.

SADLER, Michael Thomas, M.D.Univ.Lond., has been re-appointed Medical Officer of Health for the Barnsley Rural Sanitary District, at £100 per annum, for three years.

STAMFORD, William, L.R.C.P.Lond., M.R.C.S.Eng., has been appointed Medical Officer of Health for the Tunbridge Wells Urban Sanitary District, *vice* Rix, resigned.

WOOD, John, M.B.Oxon., has been appointed Medical Officer of Health for the Walsall Rural Sanitary District, at £100 for one year, *vice* the Poor-Law District Medical Officers, whose appointments have expired.

PUBLIC ANALYSTS.

ADAMS, Matthew Algernon, F.R.C.S.Eng., F.C.S. (Public Analyst for the County), has been appointed Public Analyst for the Borough of Maidstone, at £10 10s. per annum and fees.

SURVEYORS, CLERKS TO GUARDIANS, INSPECTORS OF NUISANCES, ETC.

BALLARD, Mr. G. H., has been appointed Treasurer to the Sevenoaks Guardians and Rural Sanitary Authority, *vice* Palmer, resigned.

BOVEY, Mr. J., has been re-appointed an Inspector of Nuisances for the Totnes Rural Sanitary District, at £35 for one year.

CLARKE, Mr. William Tunstall, has been appointed Inspector of Nuisances for the Newcastle-upon-Tyne Urban Sanitary District, at £150 per annum, with a suit of official uniform.

CROW, Mr. George, has been appointed Surveyor to the Teignmouth Local Board and Urban Sanitary Authority, at £180 per annum, *vice* Caink, resigned.

DAVY, Mr. John, has been re-appointed Inspector of Nuisances for the Hoxne Rural Sanitary District, at £60 for one year.

HARWOOD, Mr. James, has been appointed Surveyor and Collector to the Launceston Local Board and Urban Sanitary Authority, at £80 per annum, *vice* Dawe, resigned.

HUGHES, Mr. Hugh, Jun., has been appointed Clerk to the Aberystwith Guardians and Rural Sanitary Authority; at £60 per annum as Clerk to the Guardians, £25 per annum as Clerk to the Rural Sanitary Authority, £20 per annum as Clerk to the Assessment Committee, and £20 per annum as Clerk to the School Attendance Committee, *vice* Mr. Hugh Hughes, resigned.

MARTIN, Mr. J. D., has been elected a member of the Balsall Heath Local Board and Urban Sanitary Authority, *vice* White, deceased.

MILLS, Mr. Charles F., has been appointed Surveyor and Inspector of Nuisances to the Isle of Thanet Rural Sanitary Authority, at £150 per annum, *vice* Wells, deceased.

POOLE, Mr. Henry W., has been appointed Clerk to the Barnet Local Board and Urban Sanitary Authority, at £40 per annum, *vice* Broadhouse, resigned.

ROBBS, Mr. Decimus Mallett, has been appointed Clerk to the Gainsborough Guardians and Rural Sanitary Authority, at £90 per annum as Clerk to the Guardians, £30 per annum as Clerk to the Rural Sanitary Authority, and such remuneration as may from time to time be allowed as Clerk to the Assessment and School Attendance Committees, *vice* Oldman, deceased.

SHORT, Mr. T., has been re-appointed Inspector of Nuisances for the Berwick-upon-Tweed Rural Sanitary District, at £50, for one year.

TOMKIS, Mr. James, has been appointed Clerk to the Foleshill Guardians and Rural Sanitary Authority; at £100 per annum as Clerk to the Guardians, £20 per annum as Clerk to the Rural Sanitary Authority, £20 per annum as Clerk to the Assessment Committee, and £10 per annum as Clerk to the School Attendance Committee, *vice* Dewes, deceased.

WATSON, Mr. R. H., has been re-appointed an Inspector of Nuisances for the Totnes Rural Sanitary District, at £35 for one year.

WHITE, Mr. George Graham, jun., has been appointed Clerk to the Launceston Guardians and Rural Sanitary Authority, at £60 per annum; as Clerk to the Guardians, £5 per annum; as Clerk to the Rural Sanitary Authority, £10 per annum, for conducting the elections; £15 per annum as Clerk to the Assessment Committee; and £5 per annum as Clerk to the School Attendance Committee, *vice* Dingley, resigned.

WILLIAMS, Mr. William, has been re-appointed Inspector of Nuisances for the Christchurch, Monmouthshire, Urban Sanitary District, at £25 for one year.

SANITARY JOTTINGS.

SANITARY.

The recent opening of a new square in front of the Church of St. Germain des Prés in Paris, raises the number of Parisian squares or public gardens to 36. The aggregate area is 1,048,240 square mètres, and the annual cost of maintenance and supervision 407,000f.

A company has been formed at Dover for the erection of artisan dwellings in that town.

A large block of workmen's dwellings is to be erected at Brighton. The contract is for £10,000.

At the last annual meeting of the Artisans' General Dwelling Company, the chairman referred to the number of buildings that had been erected since the last meeting. The Company had also acquired property at Hornsey, on which it was intended shortly to build 2600 houses, 1000 of which would be for working men.

SEWERAGE.

The Local Board of Leyton, Essex, have entered into a contract with the Rivers Purification Association, of 232, Gresham House, E.C., for the purification and disposal of the sewage of their district. In these works the method of pressing the sludge into a portable condition, recently so successfully introduced at the Coventry Sewage Works, will be employed.

CHEMICAL.

The Sanitas Company (Limited) has issued its report for 1881, and declares a dividend of 5 per cent. after payment of all interest due on its debentures and founders' shares.

DRAINAGE.

Mr. Maxim, of New York, proposes to drain by electricity the basin around the city of Mexico. To do this a company has been formed, the funds raised, and the contracts signed. The plan in brief is to establish on the western slope of the mountains, where the fall is great and rapid, a number of water wheels sufficient to develop some 20,000 horse power, and make them drive dynamo-electric machines of high electro-motive power. The current from these machines is to be conducted about 20 miles to a set of electric motors placed on the margin of the lake, and driving-pumps which will require about 7000 horse-power to work them. The water has to be raised about 40ft. to clear the ridge, but once raised it has an uninterrupted fall toward the Pacific of several thousand feet, so that the descending water is made to keep up the work. The whole apparatus constitutes what Mr. Maxim calls an 'electric syphon'. Should this plan succeed, it will relieve Mexico from the inundations that have damaged it so much for several centuries.

WATER SUPPLY.

New water-works at Carnoustie, near Dundee, have been opened. The scheme, of which Mr. McCulloch of Dundee is the engineer, is what is known as an underground one,—that is, the water, instead of being collected on the surface in the usual way, is all collected below ground. The nucleus of the supply consisted of what used to be known as the Brax Spring, one of the feeders of the Lochty Burn. This spring rose in a disused quarry. About 1,500 lineal feet of adits have been cut into the water-bearing strata of the upper bed of the old red sandstone formation, at an average depth of 12 feet. 6 in. Into these fire-clay pipes have been laid, and surrounded by a filtering medium, consisting of broken red sandstone, several layers of washed gravel, sand, and coke, of a total depth of 3 ft. The water from two of these adits, of an aggregate length of about 800 ft., is led to the reservoir at a distance of about 400 yards off, in cast-iron pipes,

rovided with sluice valves to admit of the water either om the one or the other singly, or from both combined, eing discharged into the reservoir, or past it direct to the illage. The water from the remainder of the adits, being t too low a level to discharge into the reservoir, is conveyed by fireclay pipes to a collecting well adjoining the eservoir. The reservoir has been formed by excavating in natural hollow, the excavated material being thrown pon the four sides to form the embankments. It is 270 ft. quare at the top by from 19 ft. to 20 ft. deep, and contains bove the top of the outlet-pipe to the top of the overflow little over 6,000,000 gallons. There being no clay on the ite of the reservoir, the usual method of rendering the eservoir water-tight by forming a thick puddle-wall in the entre of each of the embankments has not been followed. nstead thereof the inner slopes of the embankments are ined throughout with concrete 8 in. thick, backed by clay uddle 6 in. thick on the made ground. Mr. George Mackay, contractor, Broughty Ferry, constructed the works. Messrs. Robert Maclaren & Co., Eglinton Foundry, Glasgow, supplied the iron pipes. The Glenfeld Company, of Kilmarnock and Paris, supplied the special castings, sluice, nd air valves. Mr. Robert Gellately, Lochee, acted at he outset as the inspector of works, but was laid aside from ill-health. The works have since been superintended by Mr. David Peter, inspector of works, Dundee. The total ost has been about £7,000.

LEGAL.

COMPENSATION FOR COMMONABLE RIGHTS.—Where a portion of a common is taken compulsorily by a railway company or other public body for its purposes, the compensation for the extinction of commonable rights is paid to a committee. But their powers are, Mr. Cheetham, M.P., contends, so limited that the compensation is occasionally useless to the persons interested. Consequently he proposes to provide for the better application of these compensation moneys. The Bill that he has introduced into the House of Commons on this subject empowers a majority in number and interest of those present, at a meeting of commoners, to decide that the money shall be laid out in one or more of several ways. The ways specified are the improvement of the remainder of the common, or defraying the expense of obtaining a scheme for the local management of the common, or of a Bill for its preservation as an open space, or of legal proceedings for the protection of the commoners' rights, or the purchase of additional land to be used as a common or of a recreation ground for the neighbourhood.

THE CONCORD OF CHEMISTS.—Mr. Paget disposed of an adjourned summons at the instance of the Wandsworth Board of Works, who sought to close a well in Spring Gardens, Putney. On behalf of the Board, Dr. Muter, the analyst, was called, and he stated that the water of the well was a dangerous form of water, it being three times as bad as the worst London water. It was also stated by the Medical Officer of Health for Putney, that cases of scarlet fever in the locality had been reported. For the defence, Professor Redwood stated that he had examined the water, and found it was an agreeable water to drink, it being as good as any which was to be found in gentlemen's houses in the country. One of the witnesses said he had drank the water for 52 years. He drank it night and morning, cold. Mr. Paget dismissed the summons, and ordered the Board to pay 11 guineas costs.

The West Bromwich Improvement Commissioners have recently instituted proceedings against a builder for erecting a building of combustible material, and also for erecting a chimney stack for business or manufacturing purposes without their approval, and contrary to the Bye-laws made under the West Bromwich Improvement Act of 1854, the Act of 1865, and other Acts incorporated therewith. Similar proceedings were taken against another person for unlawfully erecting a dwelling-house with rooms of insufficient height. Both defendants promised to comply with requirements of the law.

PERSONAL.

Mr. W. J. Jeffries, C.E., late of Ipswich, and at present assistant engineer at Granton Harbour, on the Forth, has been selected from 462 candidates to fill the post of surveyor to the Thames Board of Conservators.

Mr. T. Roger Smith has been appointed district surveyor for the district of West Wandsworth, and Mr. G. Aitchison for the district of East Wandsworth and Tooting Graveney.

The salary of Mr. E. D. Latham, borough surveyor of Middlesbrough, was raised by the Council, at a meeting held on Tuesday last, from £500 to £650 per annum.

The death is announced of Mr. Alty, the surveyor to the Plymouth Corporation.

Dr. Wm. Collingridge has been re-appointed Medical Officer of Health for the Port of London, Mr. W. H. Lewis and Captain Gilles, Sanitary Inspectors, and Dr. Whitcombe, Medical Officer of the Hospital-ship *Rhin*, lying off Gravesend.

Mr. Fred. Carroll, C.E., has been appointed deputy-engineer to the Improvement Commissioners of Blackrock, near Dublin, at a salary of £160 per annum.

The salary of Mr. W. G. Bennett, borough surveyor, Southampton, has been increased from £200 to £300 per annum, and that of the assistant surveyor, Mr. Hamp, from £75 to £100.

The Bradford Sanitary Association, which is the first association of the kind established in Yorkshire, have appointed Mr. Malcolm Paterson, C.E., of Bradford, as their sanitary engineer.

The Directors of the Nineteenth Century Building Society met on April 1st, and declared a dividend of 5 per cent. per annum.

Thomas Partridge, M.K.Q.C.P., etc., has been re-elected Medical Officer of Health for the Rural and Urban Districts, Stroud Union.

At the annual meeting of the Edinburgh Health Society, it was reported that 7000 copies of the past course of lectures had been sold. There was a balance in hand over the year of £30, which brought up the balance of the capital account to £109. The report was adopted.

Imitating the excellent initiative of the Belgian Government in requiring the registrar of births to give to each person registering a birth a small tract containing full instructions on the rearing of infants, the Board of Health of East Dereham, Norfolk have resolved on a similar proceeding. A copy of 'Simple Rules for the General Management of Infants', containing simple and excellent directions as to feeding, cleanliness, clothing, fresh air, and sleep, drawn up by the Medical Officer of Health for the district, Mr. H. B. Vincent, is given by the registrar of births to every person who comes to him for that purpose.

Fever still prevails to a great extent in the colliery districts of the county of Durham. Dr. Fielden, Medical Officer to the Shildon and East Thickley Local Board, reports that there have been 600 cases of fever within a twelvemonth amongst an average population of 9,000, of which 50 cases proved fatal. Dr. Fielden attributes much of the terrible ravages he has witnessed to the recklessness and folly of friends exchanging visits at infected houses. Much has also arisen from allowing infected or convalescent children to attend school, and also to the thoughtlessness of friends at funerals. The doctor strongly advises the establishment of an hospital or other building for the proper treatment of contagious disease.

NOTICES OF MEETINGS.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

The Northern District Meeting is to be held at Sunderland on Saturday, the 22nd of April. The following papers will be read and discussed:—'Street Lighting of the Future', by Mr. W. G. Laws, Borough Surveyor,

Newcastle; 'Private Improvement Apportionments', by Mr. Jas. Hall, Borough Surveyor, Stockton; 'The Canal Boats Act', by Mr. E. C. B. Tudor, Surveyor, Local Board, Goole. During the day various works will be visited.

NATIONAL HEALTH SOCIETY.

A lecture by E. Noble Smith, Esq., F.R.C.S.Ed., on 'Modern Dress and Fashionable Deformities', will be delivered at the Hampstead Vestry Hall, Haverstock Hill, on Saturday afternoon, April 22nd, at four o'clock, T. Spencer Wells, Esq., F.R.C.S., in the chair. Tickets may be obtained from Mr. Hewetson, stationer, High Street, Hampstead, at the Vestry Hall, or at the offices of the Society, 44, Berners Street, on Mondays and Fridays, 2 to 5; or will be forwarded by post on application. Members of the Society are entitled to a ticket for the lecture. Reserved seats, 2s. 6d. Admission, 1s. Payment at the doors, 2s. 6d. and 1s. Special arrangements made for schools.

The objects of the Society are to diffuse sanitary knowledge, and to encourage the teaching of the laws of health in every possible way. Membership is constituted by the annual payment of one guinea. Life membership by the single payment of ten guineas. Members of the Society are entitled to a copy of all publications of the Society, and a ticket for all lectures given under its auspices. Communications to be addressed to the secretary, F. Lankester, at the offices of the Society, 44, Berners Street, Oxford Street, W.

EXHIBITION OF LIFE-SAVING APPARATUS.

This exhibition, referred to in the SANITARY RECORD of March 15, will be held under the patronage of the Duke of Connaught, the Archbishops of Canterbury and York, the Duke of Westminster, and others, at the Alexandra Palace, from June 26 to July 22 next. Among the Honorary Committee are the Lord Mayor, the Astronomer-Royal, the President of the Royal College of Surgeons, and the Chairman of the National Lifeboat Institution. Among the objects exhibited will be valuable collections contributed by the Marine Department of the Board of Trade, the Elder Brethren of Trinity House, the Royal National Lifeboat Institution, the Royal Humane Society, the St. John Ambulance Association, and a multitude of inventions and improved appliances under the following classes:—Class 1, apparatus and models of railway signalling and safety appliances; class 2, mining safety appliances; class 3, contrivances for the prevention of street accidents; class 4, apparatus employed for the prevention and extinction of fires, and means and appliances for rescuing life; class 5, protective provisions for dwellings and other houses; class 6, improvements in firearms and explosives, devices to facilitate their safety, and prevent their accidental discharge or ignition; class 7, engineering safety appliances; class 8, tent coverings, clothing for resisting extreme temperatures or wet, or personal protection from violence; class 9, apparatus for all marine emergencies; class 10, ambulances, surgical appliances, and sanitary devices for the alleviation of sufferers from violent accidents; sub-class 10a, all drawings, photographs, illustrations, and books relating to the above subjects.

THE SANITARY INSTITUTE OF GREAT BRITAIN.

In connection with the Fifth Autumn Congress of the Sanitary Institute of Great Britain, to be held at Newcastle in October next, there will be an exhibition of sanitary apparatus and appliances, and articles of domestic use and economy from the 26th September to the 21st October. The Richardson Medal for an exhibition selected from the entire exhibition will be awarded by the judges in case of pre-eminent merit only.

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will, however, be subjected, if unnecessarily long, to a strict curtailment.

6. BARFF'S PROCESS.

Will you kindly inform me what is the present address of the 'Health Society'; and if you happen to know in what consists Professor Barff's indestructible process for preventing rust in iron. M.O.H.

[The address of the National Health Society is 44, Berners Street, London, W. A description of Barff's process for preserving iron from rust will be found in the SANITARY RECORD for June 15, 1881, page 483.]

7.

We are told by some authorities that sewer air will take the hydraulic seal of a trap by storm, and so invade the house; is this practically so? A. F. C.

[This is a very difficult question to answer, for, undoubtedly, in the laboratory certain gases can be made to pass through water-traps of any reasonable depth. With regard to the foul air in sewers, the gas there exerts no such pressure as would force for instance a Doulton's syphon. Even when the sewers were running very full it is doubtful whether, with an ordinary ventilated sewer, any pressure exists. Professor Chandler laid on the air of a sewer to his laboratory, but could not detect any pressure, on turning the stop-cock. That sewer air, as it is called, exists, however, in closed-up house-drains, there can be no doubt; and given small pipes without relief, and an unventilated cesspool beyond, the gases would be sure to bubble up into the room. There is a certain percentage to be taken off all laboratory experiments, but they are, nevertheless, very valuable. The right thing to do is, to insert a disconnection chamber between the house-drain and the sewer, with a fresh air inlet to a properly ventilated drain. The question as to whether disease germs can be given off by the bursting of air bubbles can then be relegated to chemical and pathological experts, always provided, however, that no excreta from a patient suffering from an infectious disease has been allowed to descend the drain. But even then, due flushing and proper disinfection would restore the safety in the drain.]

8.

Can you tell me if there be any Institution where I can, as a local plumber, obtain honours in my craft? ASPIRANT.

[The City and Guilds of London Institute for the Advancement of Technical Education affords every facility for carrying out an examination upon the subject of Plumbing, which is classed as No. 24 in their programme. You should apply to the Secretary of the Science and Art Department at South Kensington, London, S.W., for the list of the 'Committees of the Art and Science Schools'; or to the Secretary of the Society of Arts, Adelphi, London, W.C., for a list of any 'Local Examination Boards'. These and any School Board are competent for examining candidates through the accepted forms. Write to the Secretary of the City and Guilds of London, Gresham College, London, E.C., for the questions set in plumber's work for last year.]

9.

There is a most offensive smell in a bed-room in my house. There is no closet near it, or pipe of any description in connection with the drain. The house is not a new one, and the smell only broke out about a few months ago, at all events, in so offensive a manner. It causes nausea and vomiting; what can it be? ANXIOUS PARENT.

[It is spent smoke, depend upon it; and if a sweep be sent up the flue, he will discover cracks in the brickwork, whence the stale smoke issues into the bed-room from behind the skirting, dado, or even from behind the paperhangings. In old houses the parge lining decays through age, or is swept away in time by the action of the sweep's brush, and in jerry-built houses there is a bad parging material. When the parging coat inside a chimney has perished, the fire heat pulverises the mortar between the bricks, and soon establishes a crack between the flue and the room. Then you may expect a most disagreeable smell, sufficient to cause serious *malaise* in nearly everyone subjected to its influence.]

10.

Can you inform me who were the Architects and Builders of Bagshot Park, the new residence of H.R.H. the Duke of Connaught; also when the building was erected? I see the bad style and work of the drainage system has been blamed as the cause of the Duchess's recent illness. A CONSTANT READER.

[A report of the sanitary condition of Bagshot House has been published in the *British Medical Journal* of March 17. We do not think it advisable to make public the names of the Architects and Builders concerned in the erection of this house.]

Scarlet fever of a somewhat virulent type exists at Burradon and other colliery villages near Newcastle. The schools have been closed, and other precautionary measures adopted.

ORIGINAL PAPERS.

NOTES ON INFECTIOUS HOSPITALS FOR NON-PAUPERS IN RURAL DISTRICTS.*

By JOHN MAKINSON FOX,
Medical Officer of Health, Mid-Cheshire Combined Sanitary District.

THERE can hardly be a workhouse in the country in which there is not hospital provision of two kinds —one for the reception of cases of general sickness, and a second, usually built apart, for cases of infectious disease. But the idea of isolation, here, has been, not for the benefit of the patient, or the protection of the community, but simply for the protection of other inmates of the workhouse.

Since the prevention of epidemics in towns and villages has so much engaged the attention of Local Authorities, there is no doubt that an extended application has been made of this provision for the separation of paupers seized by infectious sickness, by rendering it available for persons generally in any part of the district with which the workhouse is connected. Indeed, persons have been fictitiously created paupers, in order that the only existing means of isolation might be legally brought into use.

The 37th Section of the Sanitary Act of 1866 first gave to Local Authorities the power to erect hospitals or temporary places for the reception of the sick, for the general benefit of the community; and the 26th section of the same Statute gave any Justice power to direct removal in certain cases. Neighbouring Authorities also were allowed to combine to provide and maintain a common hospital. These sections have been re-enacted, with little modification, in the Public Health Act, 1875.

It must be noted that always, both in the earlier and later Statutes on this subject, only a permissive power has been conferred upon sanitary bodies, and no duty has been created enforceable by legal process.

But many Corporations, Local Boards, and Boards of Guardians, have been desirous to advance with the times, and to avail themselves of every indicated equipment for dealing with preventible mortality. Hence, in spite of the merely permissive character of the law, many infectious hospitals, of every variety of cost and magnitude, have been built, and much experience has accumulated in the sixteen years between 1866 and the present time.

It has been said that legal phraseology is always intentionally vague, in order to open a door and leave room for the usual practice of lawyers. No better illustration of this could be found than in the definition, in the Act, of those for whom hospital provision of the kind spoken of is to be made. It is alleged to be for those:—(1) Without proper lodging and accommodation, (2) for those in rooms occupied by more than one family, or (3) on board ship.

Much excusable unwillingness has been felt as to putting in force the Section dealing with compulsory removal (124 Public Health Act, 1875), in the absence of precedent to interpret the language 'without proper lodging and accommodation', and another vague term to be presently mentioned, 'convenient distance'. There is no doubt that had the Section clearly expressed that the requirement of means of effectual isolation of the patient for the protection of the public was intended here, the beneficial design of the Legislature would have received a very much wider application.

But in spite of the difficulty thus at the outset thrown in the way of Medical Officers of Health, who have been expected to work with such a miserably inadequate legal instrument as this, sanitary science and practice have so commended themselves to the public judgment that it is likely the rational view would be taken by any Court to which a case might now be referred; and any occasion for such reference is becoming each year less likely to arise.

The growth of public intelligence in regard to sanitary matters is in no department more conspicuous than in the present attitude of society towards infectious hospitals. The desire for them may not always proceed from unmixed motives. Thus, shop-keepers, feeling that their custom is at stake, will give a grudging patronage to treatment by isolation. Rich masters, when domestic servants are taken with an infectious disorder, are loud in crying out for the conveniently and inexpensively protective aid of the sanitary officers. The principle underlying the erection of hospitals is, however, thus conceded, and unpleasant responsibility might now attach to a sanitary department where some provision of this kind was not ready beforehand.

In so rapid a development of public sentiment it is easy to see that a danger might be incurred of overshooting the mark in regard to the aim and scope of hospitals of this character, and the following considerations may afford profitable matter for discussion:—

1. It should be borne in mind that the diseases which these hospitals are designed to deal with are not such as we expect always to have in our midst. We have ventured to accustom the public to the word 'preventible' in regard to them. And if we really are honest, and mean that they are so, many hospitals, erected with much *éclat*, cost, and magnificence, may become tenantless memorials of the age of allowed insanitary conditions.

2. For during the time that the mind of the public has been becoming familiarised with ideas of treatment by isolation, much other preventive sanitary work has been going on apace. Our population, for example, are becoming each year more saturated with efficient vaccination and re-vaccination. Enormous sums of public money are being expended yearly on large water and drainage schemes. The Public Health Amendment Water Act is altering the character of water supplies in rural districts throughout the country. Nuisances which used to mark and characterise localities not overlooked by large and costly urban staffs, are now things of the past. The general principles of health, in regard to the house and the person, are better understood and more largely acted upon. Caution, unknown before, in regard to the spreading of infection, is exercised under the direction of sanitary Inspectors, where cases of infectious disease are treated at home. Surely all these features of modern society indicate that provision for diseases associated in their origin with insanitary conditions should designedly be of a temporary character, and on a diminishing rather than an increasing scale.

3. The object of hospitals for infectious diseases should be clearly understood, namely, that they are for the prevention, not the treatment, of epidemics. Such hospitals fail in their first and proper use if an epidemic find occasion to arise. They are essentially

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* Read before the North-Western Association of Medical Officers of Health, March 1882.

for first cases; hence the absurdity of their being expected to fulfil this function in the absence of provision for the compulsory notification of infectious diseases. It is quite true that, when an epidemic is ever so widespread, the removal of each single case is equivalent to the withdrawal from the community of as many separate centres of infectiveness. Still, for this secondary use, as one little likely to be of frequent occurrence, it would appear that a temporary extension of a small permanent building would be the most convenient and becoming arrangement.

4. The public may be led to expect too much from this confident parade of preventive machinery. It seems to ignore the fact that many conditions controlling the behaviour of zymotics, affecting their cause, intensity, and diffusiveness, are yet unknown to us. We have all had to deal with single cases of scarlet fever, and even of small-pox, which have not spread. Ordinary arrangements in the dwelling, under powers short of hospital provision, have appeared to be adequate, and no epidemic has arisen. On the other hand, cases have again come under notice, and the same precautionary measures have been instituted, but fresh cases have sprung up, and, before our alarm has been well excited, we have found ourselves face to face with a public calamity. Hospitals, it is feared, will leave us where we were, in regard to this undefined liability. Hence the wisdom of making all arrangements in connection with them as simple and unostentatious as possible. If the provision be in excess, either as to dimensions or cost, it will equally be made a reproach when full and when empty.

5. It is desirable, too, that the professional mind, at least, should be alive to the *post hoc propter hoc* fallacy which underlies the indiscriminate laudation of the part which separation-hospitals have played in the suppression of epidemics. Epidemics, as all of us know, have been nipped in the bud without hospitals; and they have arisen and been much prolonged in spite of their employment. But the existence and use of hospital arrangements always make it safe—as it is easy, though not instructive—to say, with an eminent authority, 'How much more disease there would have been, in the absence of the hospital, can of course only be a matter of surmise.'

6. Much responsibility, which may be disastrous in its consequences, will always attach to the Medical Officer in connection with the administrative and medical management of a special hospital, controlled, not by an interested and propitious committee, elected by promoters and subscribers, but by critical representatives of murmuring ratepayers. And the control of such an institution involves many liabilities which cannot be contemplated by a responsible head with the equanimity which pervades the merely official mind. What is meant is, that to direct from a Government Office, or in a Blue Book, generally, that hospitals should be built, or to enunciate the same theoretically from a professor's chair, is quite a different thing from a person becoming himself responsible for a definite expenditure, to be applied and administered for a definite purpose, which may be realised or not; whose own official status and maintenance may depend, more or less, upon the usefulness of the enterprise. For, let it be noted, these hospitals in country places are entire misnomers. They cannot be hospitals at all. Where is the medical staff, resident or otherwise? They are mere lazar-houses or places of quarantine; and wherever disappointment is felt in regard to inadequate arrangements, the pressure of censure and discredit will fall upon the medical officer of the interested authority.

It remains now to pass in review the assistance that has been offered to Medical Departments by official memoranda and reports on the subject from the Local Government Board. The official Memorandum entitled 'Hospital Accommodation to be given by Local Authorities', was first issued in the year 1874. It was re-issued in the 6th Annual Report of the Local Government Board for the year 1876, and it is again referred to in the official statement on the subject in the year 1878. The vague language of the Statute already alluded to is rehearsed in it, with no attempt at further definition or explanation. In fact, upon other matters also, in which some clear expression of views might have been expected, the vague language of the Statute is emulated; and by many it may be thought that the medical writers 'better their instruction'.

As to the amount of accommodation required, the safe general remark is thrown out, that 'the quantity of accommodation wanted will, of course, be widely different in different cases'. That is to say, Birmingham will require a different amount of accommodation from that needed by a Cheshire village! But it is added, 'it must always be remembered', as applicable in every case, that two separate infectious diseases cannot be located in the same ward. As to the quantity of accommodation, there certainly seemed to be the opportunity in the Memorandum, *if the knowledge existed*, of laying down some useful guiding principle, referring the amount required to some known basis of population, or incidence of epidemics from peculiarity of local conditions. But application is made in vain to the official statement for any information of the kind; and all the information vouchsafed is the self-evident proposition that cases of small-pox and measles must not be grouped together in the same apartment!

Again, 'as regards villages', it is said, 'each village ought to have the means of accommodating instantly, or at a few hours' notice, say four cases of infectious disease, in at least two separate rooms, without requiring their removal to a distance'. The only hint at combination in the fulfilment of the object is in the words, 'and small adjacent villages (if under the same Sanitary Authority) might often have such arrangements in common'. It is also said, in the 131st section of the Act, 'Two or more Local Authorities may combine in providing a common hospital.'

Now, in the above cited instructions, if such they may be called, the same vagueness may be complained of. Indeed, in one respect it may be doubted whether or not the direction is misleading. To say that each village should have the means of isolating, by removal, cases of infectious sickness 'without their removal to a distance', is to direct an administrative impossibility; indeed, is about as impracticable as the statement in a Report on the disposal of excreta that, for safety, all privies undealt with by ashes should be scavenged daily. All depends upon the extent or limitation assigned to the word 'distance'. Any unprejudiced person reading the Memorandum with no light from modern developments would suppose that the hospital should be within sight, or within an easy walk, for accessibility of the patient to friends and relatives; more especially as the word 'adjacent' is used in regard to combination. Anything like five or six or seven miles would, in the light of many reasons that occur to the mind in connection with removal, say, of cases

of scarlatina, appear to be just the amount of 'distance' that is deprecated; for, 'of course' (to quote the language of the Memorandum), removal to the Moon, or to the Metropolis, is hardly supposed to be under contemplation.

It is true that concentration, as much as is possible, or as much as may be consistent with efficient and humane management, is most desirable in the design and erection of infectious hospitals; for each additional hospital awakens increased hostility amongst those who live where it is placed, and itself creates an additional centre for lodgment of infective materials.

But it must also be considered that the grosser plagues affecting adults, and striking down large numbers, are amongst the records of the past. Even typhus, not to mention Asiatic cholera, is an impending evil that few would think of making permanent provision against. It is for children that the hospitals under consideration will mostly be required, except in unusual cyclic outbreaks of small-pox, which, it is largely contended, are always most efficiently treated in tents or temporary huts. And it is in the question of the removal of children that the element of 'distance' becomes an important consideration, having reference not only to danger of removal in the midst of illnesses marked by acute fever and suffering, but also to willingness of parents to part from their children in such circumstances, or the humanity of those who could demand a separation of such a kind as might involve the inevitable absence of parents in case of sudden need or change. These are contingencies with which the practical medical officer on the spot has to contend in a manner, and with results, unknown to public theorists, influenced only by a large concern for public safety, but apt to overlook actual details of management.

In the 124th Section, giving compulsory power for removal, the word 'convenient' is used in reference to distance, which is as vague as could be conceived, and affords little ground for interest, except to contending lawyers.

The Memorandum already cited also speaks of 'accessibility of situation, so that the sick may not be exhausted by long journeys' (another indefinite expression), as a condition to be 'particularly studied'. The point as affecting the willingness of friends in regard to the removal does not find notice in the Memorandum; but it is mentioned in a most interesting manner by Dr. Buchanan in his report on the hospital accommodation adapted to the requirements of Birmingham and the Aston Union, published in the Local Government Board Report, Medical Department, for the year 1874. Thus, he states that 'to carry a person suffering under acute disease to any unnecessary distance' (what is an unnecessary distance?) 'from his home to hospital, is to excite in his friends objections to the transference, and wantonly to expose the patient himself to pain and danger.' The word 'unmerciful', as applied to distance, is also used. These are sentiments well intentioned, creditable, as I think, to the writer's mind and heart, but at issue with modern practice. The practical inference is irresistible; namely, that to seek to remove children further than an easy walking range from their parents, during the time that they are suffering from acute and dangerous illnesses, is a course, however likely to secure the protection of the community, alike opposed to the requirements of the Statute, to the published teaching of its official expounders, and to the common instincts of humanity.

It may be thought and affirmed that the word 'humanity', and any appeal to its instincts, are out of place here, except that the truest humanity would regard only the protection of the community, apart from considerations of private and individual suffering. It is only necessary to carry out this reasoning to its full logical issue in order to justify and legalise the use of the pole-axe, by means of which the spreading of diseases amongst cattle is effectually controlled. The present paper, having reference to difficulties in the way of forming a judgment as to the warrant, position, and amount of hospital accommodation, referring also to the undefined language used in regard to them in the Act itself, as well as in the official Memoranda which illustrate its mode of application, is designed to plead for as mild and mitigated, as tentative and temporary, a compliance with the order as possible, in the absence of a wider experience, and more exact directions from those to whom we naturally and loyally look for direction in these matters.

THE SINS OF THE PLUMBER.

By W. K. BURTON,
Resident Engineer to the London Sanitary Protection Association

IV.—FAULTS IN DRAIN VENTILATION.

THERE are few parts of the drainage-system of houses in which error is more persistently made by the builder and plumber, than in that which appertains to the ventilation of the various pipes. The errors, which are commonly made, rise more from ignorance of the principles involved, than from scamping of work. Of course, bad workmanship is to be found in the pipes which are intended to ventilate the system, as well as in those which are intended to carry away the sewage; but the defects due to such bad workmanship do not make themselves so evident in the former as in the latter case. Ventilating-pipes are usually fixed entirely outside a house, and, moreover, there is not in them, as in soil-pipes, a frequent rush of water compressing the gas before it, and causing it to escape in large quantities by any leakage which may exist.

The reason why more ignorance should exist in this particular branch than in any other is, I believe, because a lack of ventilation does not make itself evident so readily as a fault in a drain-pipe. If a drain or soil-pipe becomes totally choked, it is at least probable that the fact will, sooner or later, make itself evident, but it is not nearly so likely that if a pipe be unventilated it will come to the knowledge of the householder. No one would expect that sewage would flow through a pipe open at one end but closed at the other, yet it would seem that most builders and plumbers expect to get a circulation of air in a pipe left open at one end only. Such circulation is not much more likely to take place in the one case than in the other. The faults in ventilation of house-drainage system may be classed under the following heads:—First, arrangements which fail to cause a free circulation of air through the pipes which it is proposed to ventilate. Secondly, arrangements which discharge the gases carried away by ventilation in improper places. Thirdly, such arrangement of pipes as causes communication to be made between one side of a trap and another. Besides this there are, of course, actual structural defects leading to leakage, etc.

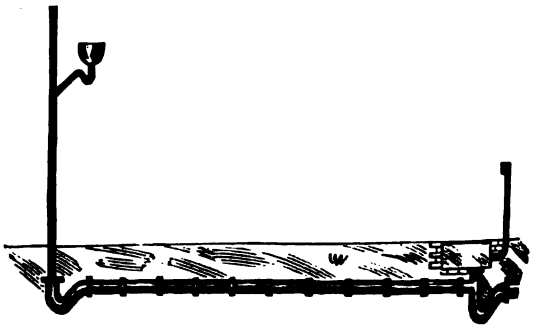
With regard to the first fault, it must be understood

that by ventilation is not merely meant the provision of means for releasing gas which accumulates under pressure, but it means the provision of such arrangements as may cause a constant circulation of air through the pipe to be ventilated; so that any foul gas which may be generated shall be carried off immediately. It may be said at once, that in no case can a circulation of air take place in a pipe, unless it is open at both ends. On the other hand, if a pipe have both ends open, and be not contracted at any part, a circulation will be found to exist at all times. It may occasionally be feeble, but whenever there are gases generated which it is desirable to get rid of, these very gases will serve to stimulate the current, because they differ in specific gravity from atmospheric air, and usually in temperature also. Decomposition, the action which gives rise to all foul gases in drains, is nothing more nor less than slow-combustion, and as such, always generates heat.

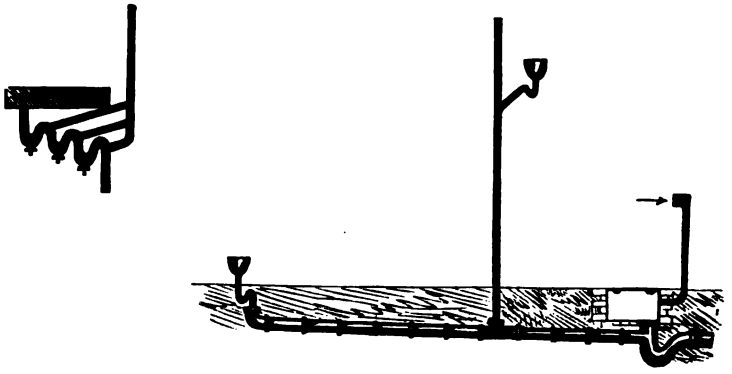
To return to the actual faults exhibited under the first heading, the greatest of them, and the commonest, consists in the total non-existence of ventilation. In such cases there is not even provision for taking off gases which generate at pressure, nor of relieving the pressure due to rise in temperature. A certain amount of the gas contained in the system must consequently escape at some point, and generally into the house. Next to this excessive, but very common case, comes the one where the system is ventilated by some one or more pipes, but where these are totally inadequate to serve the purpose intended. To take a few examples: there is nothing more common than to see a large house-system ventilated by only one small pipe, about an inch in diameter. I remember one particular case, where about 300 feet of 12-inch drain-pipe was ventilated (?) by a pipe half-an-inch in diameter, about 80 feet long, and with five or six right-angle bends in it! Nor was this a very old piece of work, but was found in a large country mansion built within the last few years. It is useless to enumerate further examples of such cases, suffice it to say that in about three-quarters of the houses in London where ventilation is attempted at all, the pipe which is supposed to perform this function is not larger than one and a half inches in diameter, and is often much smaller; and this in spite of the fact that all sanitary authorities have, for the last many years, declared that for the ventilation of the drain of an average house, at least one pipe, four inches in diameter, is necessary.

Even in the few cases, however, where such a pipe is fixed, and where, therefore, the system looked at *as a single* pipe, is provided with a sufficient opening *at one end*, it is most rare to find any opening at the other. In other words, even where the soil-pipe is carried full-size above the roof, or when a large-sized separate ventilating pipe is provided, it is very uncommon to find any provision for inlet-ventilation at the lower end of the drains, and without such provision it is, as I have said, impossible to have circulation of air.

When it does occur that both inlet and outlet ventilation have been efficiently provided for, it is, as a rule, a sign that attention has been given to the sanitary arrangements of a house, by some one who understands the matter, and it is likely the desired current of air will be found to exist; but there may still be causes to prevent this. One of these, and one which is not so uncommon as might be supposed, is to be found in the existence of a trap at the foot of the pipe, which is supposed to act as the ventilating-pipe. I have never seen a case of this, where the provisions for outlet and inlet had been provided when the house was first built, but have known more than one case where an intercepting-trap, with manhole and air-inlet, had been fixed under the front area, and where the soil-pipe had been carried full-size above the roof, but *where the trap originally existing*



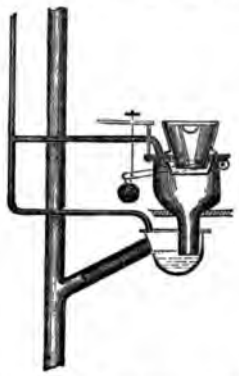
at the foot of the latter had not been removed. I illustrate by a sketch this state of affairs. I may



mention that the smoke test is most useful to prove the clearness of the system.

It frequently happens that there is no obstruction between the inlet and the outlet, but that the outlet-pipe is in such a position that it serves to ventilate only one part of the drain, and leaves a large portion quite unventilated. For example: I have frequently seen a case where there was a water-closet in the back part of the basement of a house, and where the soil-pipe, passing up about the middle of the house, served as the only ventilator. It is evident that the portion of the drain between the back water-closet and

pipe was quite unventilated. I illustrate this affairs. It frequently happens that a long



drain is left unventilated. This should never It has been laid down by Mr. Hellyer, that le foot of drain should be so arranged that not a constant current of fresh air through it. this is going a little too far, but certainly no a drain, more than a few feet long, should be ventilation.

at number of bends in a pipe seriously oppose age of air. It is impossible always to avoid ut one sees frequent cases where a pipe has nt, apparently for no other reason than that nber should show how nicely he can do it.

ng on to the arrangements which lead to the e of the products of ventilation in improper may say that these mainly consist of venti- pes terminating too near a window, or occa- a chimney. This defect is met with most ly in the very common case where a soil-pipe carried up as a rain-water pipe. This is an nent which should always be condemned. I s very day seen a case where a soil-pipe, ven- the whole drainage-system of a house, and to ventilate the sewer also—for there was no ting-trap on the drain—was carried up as a er pipe, which terminated just below, and ne foot of, a bed-room window. I noticed ry house in the row had exactly the same nent. This matter is one on which it is un- y to enlarge. It should be sufficient to say ntilating-pipe should always be carried clear e every part of the house, and should termi- east 10 feet from any window, and not near nney.

case of mal-arrangement of the air-inlet be considered in the present connection. It understood that there can never be any cer- nat the current of air will always be in the n that is intended. It is sure to be reversed r a large amount of water is poured down pipe. It will not, therefore, do to arrange t in such a way that any gas can blow into se from it. If there be plenty of open space, ne case of a country house, it is sufficient o leave the inlet open to the air, but if it be ry to draw from a confined area, such as is ith London houses, a mica-valve should be fixed on the end of this inlet-pipe.

s in ventilation, of such a nature as to cause nication between one side of a trap and the nd which, in fact, nullify the trap, are not o common as either of the other two, but are nally to be met with. I give two typical examples, which will show the sort of thing that is to be guarded against. I have actually seen both of them, and each occurred in a house where much consideration had been given to the sanitary arrangements. The first is a case where the plumber had wished to make *very* sure of the disconnection of his sink from the drain, so he put *three* syphon-traps under it. He also thought it would be advisable to ventilate the branch drains leading from the sink, and no doubt he was quite right so far. He also knew that if two traps be fixed without ventilation between them, they may unsyphon each other, so he very properly took a ventilating pipe from between *each pair* of traps, but unfortunately, he branched each of these pipes into the pipe from the drain. The effect of this will be seen to be that two of the traps might as well not have existed. The second is a commoner instance of a similar error. It consists in branching the ventilating pipes from the container of a pan-closet or the trunk of a valve-closet, into the ventilating pipe from the soil-pipe or soil-pipe side of the closet-trap. It will be seen that the result is to put the two sides of the trap into direct communication ; to do away with the seal of the trap altogether.

It is necessary to use the greatest caution in branching one ventilating pipe into another, and it may be laid down as a general rule that such a proceeding is never advisable. As regards structural defects, it may be said, that they are the same as those which are to be found in soil-pipes, and that the same precautions should be taken to keep ventilating pipes gas-tight as are used for soil-pipes.

I have confined myself in the foregoing remarks to the ventilation of drains and soil-pipes only, but it may be said that *all* discharge pipes should be so arranged that there may be a free circulation of air through them ; that is, they should be open at *both* ends to the outer air.

Since writing the above, I have seen a case of stopped, or at least, impeded ventilation, which, I think, must certainly be of rare occurrence. It can scarcely be laid at the door of the plumber as a fault, but it is so curious that I must describe it. A small ventilating pipe was carried up the wall of a house. A remarkably fine Westeria creeper had grown up beside it. A large branch of this had become entwined with the lead pipes. The two had become twisted together in the form of a two-stranded rope, and at one place the pipe was completely flattened.

CONSTANT WATER SUPPLY.—Considerable progress has been made during the past two years, in the London water supply, in the extension of constant service. Colonel Frank Bolton, the Metropolitan Water Examiner, states in his last monthly report that all the companies are at present voluntarily moving in the matter under the provisions of the Metropolis Water Act, 1871, in some portion of their districts. The number of miles of streets containing mains constantly charged, and upon which hydrants for fire purposes could at once be fixed in each district of the Metropolis, is 751¼, the different companies having as follows :—Kent, 85 miles ; New River, 212 ; East London, 85 ; Southwark and Vauxhall, 117 ; West Middlesex, 82 ; Grand Junction, 36¼ ; Lambeth, 70 ; Chelsea, 64. The increase has thus been 11 miles by the New River Company, 4½ miles by the Southwark and Vauxhall, 12 miles by the West Middlesex, 4¾ by Grand Junction, and 8 by the Chelsea, since December, 1879, or a total extension, in about two years, of 30¼ miles. On all these the companies are prepared to fix hydrants.

ON THE ORIGIN OF THE LATE OUTBREAK OF SMALL-POX IN THE COUNTY PRISON AT MAIDSTONE.

By Rev. J. H. Timins, M.A. Trinity College, Cambridge, F.G.S.
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An outbreak of small-pox such as that which occurred in the County Gaol at Maidstone at the commencement of the present year, is a subject of peculiar interest. It has been investigated by the Medical Officer of Health for the borough of Maidstone, Mr. Adams, who failed to discover the origin of the disease with anything approaching to certainty. After having satisfied himself, by careful inquiry, that it did not originate with the food, or with the stores, or with the warders, he confessed his inability to find the least trace of any cause for it, unless a certain short sentence prisoner, whose case he describes, could have been the vehicle of contagion; and this hypothesis, when the evidence, which has with much ingenuity been brought to bear upon it, comes to be scrutinised, is found to depend on such a concatenation of improbabilities, that it cannot be accepted as a solution of the question.

The following is a summary of the facts of the case. The mate of a barge frequented the 'Ferry Inn' at New Hythe on the 12th and 13th of December, after the invasion of the primary fever preceding the eruption of small-pox. Alfred S. went to drink at the same inn on those days, and may or may not have met the mate of the barge there. He was sent to Maidstone Gaol on the 29th December, and remained there until the 2nd of January at noon. After leaving the prison, on the day of his discharge from it he felt ill, being sick and trembling; and in a day or two he observed a rash, which consisted first of red blotches which rose up, some coming to mattery heads; and he got medicine from a chemist. He had a good vaccination scar on the left arm, and two good vaccination scars on the right arm. The hypothesis is, that this man had modified small-pox, and that ten prisoners were infected by him. Now if this man's illness was really mitigated small-pox, there must have been a latent period of at least twenty-one days, between his infection by the bargeman and the first symptoms of the primary fever. If the prisoners caught small-pox from him, he must have infected some of them towards the end of the latent period, 'the earliest exposure lying between December 28th and January 2nd'; and he must have infected the other prisoners 'the latest exposure between January 2nd and January 7th', after he had left the prison. And then, after the invasion of the fever and development of the eruption of small-pox, he must, all of a sudden, have become innocuous to his neighbours; for, although he had no medical advice and took no precautions, nobody outside the prison walls is supposed to have been infected by him. Any one of these circumstances would have been sufficient to make it highly improbable, and all taken together must make it appear next to impossible that ten prisoners could have been infected with small-pox by that person, and in that manner. We must therefore look for some other source of infection from which the outbreak of small-pox in the county prison may have been derived.

First, as to the nature of the outbreak itself. We *know*, from the elaborate report of Mr. Adams, that *it was confined to the east division of the gaol*, being one of three similar blocks of buildings into which it is divided, and that the seizures succeeded each other in the several corridors and cells in no regular order. This is just what might have been anticipated, supposing the germs of the disease to have been conveyed with the floating matters of the atmosphere into the courts and cells of this particular block of buildings. Next, as to the time at which the prisoners must have been infected. This is distinctly marked by Mr. Adams, as included within seven days after December 28th. The weather at that date and for a few days before and after was dull, damp, and misty, and was therefore especially favourable to the dissemination of contagia. Thirdly, at what distance from the gaol were there any small-pox patients, who were at that particular time throwing off the contagia of small-pox in a dangerous form? There was, at least, one such case at that time in the Cottage Small-pox Hospital in Tufton Street, which is about 1000 feet to the southward of the buildings in the east division of Maidstone Gaol. The mate of the New Hythe barge was admitted on the 15th of December, the eruption having appeared when he was in Maidstone on the preceding evening, and he there passed through a very severe attack. As I did not see the progress of the disease in that case, I can only follow its course from the analogy of other cases of a similar character. The pustules would have discharged their contents about the 25th of December. On the 26th the dried crusts would have commenced falling off. On and after the 28th or 29th there would have been exfoliation similar to that which occurs after scarlet fever. I have known this to have been so abundant for two or three days, as to have presented the appearance of a layer of fine sand beneath the patient's body. It is only by frequent changes of bed and body linen, and their careful removal and immediate and complete immersion in a disinfectant of sufficient strength, that danger from this source can be obviated. We cannot rely on such precautions being effectually carried out in such small-pox hospitals as that in Tufton Street. I have myself inhaled a suspicious effluvium, uncombined with the odour of any disinfectant, in passing the premises when there was small-pox in the hospital, within the last few months; and the Medical Officer of Health for the borough told the Inspector, at a Local Government Board inquiry on the 14th of February last, that beyond all doubt small-pox had spread from that hospital to persons in the neighbourhood. The only remaining question, therefore, is, how far was the infection of small-pox likely to have spread under the circumstances which I have described? This question cannot be answered off-hand. Dr. Collie, Medical Officer of the Fever Hospital at Homerton, and Dr. McCombie, Medical Superintendent of Deptford Hospital, have named ninety feet as a safe distance from a small-pox hospital. Dr. Tripe, Medical Officer of Health for Hackney, agrees with them in theory, but he has adduced statistics to prove that small-pox has spread from Homerton Hospital to places within a quarter of a mile of it, in proportion to their proximity to the hospital.

The Society of Medical Officers of Health have resolved not to express an opinion on the limits of the extension of small-pox from a small-pox hospital, the question being still *sub judice*. It would, in fact, be as easy to say at what distance from a bed of weeds a garden may be sown with their seeds, as to say at what distance from a small-pox hospital the seeds of contagion conveyed from it may germinate.

For we know that infection depends not merely on the nearness of an infected person, but upon the accident of a particle of infective matter being brought into contact with an absorbent surface. And as the contagia of small-pox are not volatile, and have no locomotive properties of their own, they must go just where they may be carried; and if the vehicle of their conveyance be the atmosphere, the direction of their course and the distance to which they will travel must be influenced, as with other floating matters, by atmospheric conditions. Now, Dr. Copland has mentioned a case, communicated to the late Dr. Haygarth by an American physician, in which the contagia of small-pox crossed a river 1,500 feet wide, and affected ten out of twelve carpenters on the other side. And if ten out of twelve carpenters could be thus infected at a distance of 1,500 feet, there can be no improbability of the infection of ten prisoners out of 150 at two-thirds of the distance. The east division of the gaol is the part nearest to the hospital; and the numerous particles of skin-dust and minute flakes of dried matter which were daily given off by a patient in Tufton Street, at the very time at which the prisoners must have become infected, would have been carried, with other less palpable contagia through the humid air before a southerly wind, directly into the courts and cells of this division, and of this division only.

This would account for the limitation of small-pox to the blocks of buildings in the east division of the prison, and for the irregular manner in which the several cases succeeded each other in the different corridors and cells. If this be the true account of the origin of small-pox in the county prison at Maidstone, it will show that small-pox may, under conditions exceptionally favourable to the dissemination and transmission of its contagia, be conveyed to a distance of 1,000 feet from a small-pox hospital. And if this were not the cause of the infection of the prisoners, it yet remains a mystery.

THE GAS EXHIBITS AT THE SMOKE ABATEMENT EXHIBITION AT SOUTH KENSINGTON.

ON examining the various, and in many cases ingenious, appliances for the combustion of fuel, and the production of heat, and also the different samples of fuel exhibited at the late Smoke Abatement Exhibition at South Kensington, the large space devoted to stoves and apparatus for the consumption of coal gas for producing heat was very conspicuous, the different exhibitors having displayed apparatus of a very extensive and complete character, and so varied in nature and form as to supply all the needs, whether of heating or lighting, of domestic establishments, to the exclusion of solid fuel, and in the shape of gas engines, to meet the demand for the production of mechanical force, without the consumption of solid fuel in boilers.

A large amount of attention is now being given to the manufacture of apparatus for burning gas for heating, and from the resulting cleanliness, reliability, general convenience, and, when properly used, economy, its use is likely to spread, and become one of the readiest and most practicable means of abating the smoke nuisance in our large towns. The use of gas for heating purposes may be divided into two distinct sections, viz., that for cooking, and that for general heating. In the Exhibition, stoves for each of these purposes were largely shown.

For cooking, there were stoves in which a single chop could be cooked, ranging from this, through all sizes, up to one capable of cooking 400 lbs. of meat at one operation. There were also appliances for boiling a pint of water, and ranging from these up to hot plates, upon which the operations of boiling, grilling, etc., for a large establishment could be carried on; the most numerous display being of cooking stoves suitable for families of about twelve persons, in and upon which all the everyday operations of roasting, baking, boiling, and stewing, could be conducted. There were four different methods of burning and applying the gas for the purposes of roasting, the most general being that of burning the gas with a 'Bunsen' flame inside the roasting oven, the others having luminous flames inside the oven, luminous flames outside the oven, and luminous flames reflected down upon the joint that was being cooked; with these modifications the exhibits were generally of the same character, with differences only in details of construction. The 'Bunsen' flame was almost invariably adopted for burning the gas for boiling and hot plates; there were, however, a few exceptions in favour of the luminous flame. There were also stoves in which gas was combined with other fuel, which possessed the advantage of producing a fire for the general use of the kitchen, when cooking was not going on, but these were not so economical as the ordinary gas stove.

For general heating, the stoves were very numerous in form, but they may all be classed under three divisions, of which close stoves, traversed by currents of air heated by conduction, the gas burning in separate chambers, were the most numerous. This class of stoves, when properly fitted, and drawing their supply of air from external sources, with arrangements for removing the products of combustion of the gas from the apartment, are more perfect from a sanitary point of view, as well as being more economical, than any other, whether the fuel used be solid or gaseous. The next division were open stoves or combination fires, in which gas was burned in combination with other substances, some of a combustible nature, such as coke and anthracite, and others incombustible, such as asbestos and fire-brick lumps. Of all these there were numerous examples, varied in form, but of such a nature that they could be compared with the ordinary coal fires of our domestic hearths, over which they possess the advantage of being smokeless, and entirely under control as to amount of fuel consumed, as they could be instantly lighted when required, and as rapidly extinguished when not wanted. In this division were many examples of the combination of gas and coke, on the principle introduced by Dr. Siemens. The third division were gas baskets, or fires in which gas was burned alone, the heat being absorbed into fire-brick and iron network, and given off by radiation, or reflected from the burners from bright surfaces of brass or copper. The former of these are of a very convenient form, and may be suspended on the bars of an ordinary grate, and so moved from room to room, to be used where required. One form of these, as exhibited, had a very pleasing effect, being formed of a slotted fire-brick lump, the slots filled in with asbestos fibre, the whole fitted with a bright metal frame; when the gas was lighted, the asbestos became incandescent, and looked very cheerful, radiating at the same time a genial heat from the fire-brick lump. Several of the reflector stoves had also a bright and cheerful appearance.

A variety of instantaneous water heaters, in which gas was the fuel used, were exhibited. These all appeared to do their work very rapidly and efficiently, and would be a great acquisition in most houses, their action consisting of the heating of a stream of water on its flow from the cistern to the point of use, to a temperature proportioned to the quantity of gas used, and the volume of water being delivered.

Gas engines were largely shown, and their use, as they are improved in efficiency and economy, is rapidly extending, their convenience and cleanliness rendering them suitable for use in many positions, where steam engines, from the space required for boilers, and the inconvenience of using solid fuel, are inadmissible. Being made of small size, they are adapted for superseding manual labour in many nstances.

An entirely new application of the use of gas to manufacturing purposes, in the shape of a kiln for glass and pottery burning, also adapted for burning tiles and bending glass, was shown in operation. It was stated to be working with very satisfactory results, both as to efficiency and economy, at one of the largest glass works in London. Gas burned on the same principle was also applied to the heating of bakers' ovens; the work done being very satisfactory, and the advantages over the system now generally in use very marked.

Gas burners of various forms were shown by many exhibitors, and the varying amount of light produced from the same quantities and quality of gas, when used in different burners, showed that gas, as ordinarily burned, does not, as a rule, give the amount of light of which it is capable. The introduction of new and improved forms of burners, tends not only to the production of more light from a given amount of gas, but the more perfect combustion prevents the tendency of undue pollution of the atmosphere, the universal result of the improper combustion of any light or heat-giving material.

In conclusion, the information obtained from an examination of this section of the Exhibition showed that gas was applicable to the production of heat for all domestic, and for many manufacturing, purposes, and that great attention had been given to the manufacture of apparatus for its use, and that for cleanliness, convenience, and absence of smoke arising from its combustion, its use is calculated to promote, in a pre-eminent degree, the object of the Smoke Abatement Committee.

Mr. W. H. H. Bromley, M.P., has given a new burial-ground to the parish of Welton, the hon. gentleman's country seat, and has laid it out at his own expense.

We have pleasure in announcing that the £50 prize offered by Mr. ex-Sheriff Burt, in connection with the Shipwrights' Exhibition, held at the Fishmongers' Hall, for the best system of ventilation for application to steam-ships, has been awarded to Messrs. Boyle and Son, the well known ventilating engineers of Holborn Viaduct and Glasgow. Although the decision of the judges was arrived at shortly after the Exhibition opened, an objection was lodged against it by an American inventor, who was a competitor, on the ground, we believe, that his appliance had not received due attention at their hands. Desirous to discharge their duty to the best of their ability, the Committee reconsidered their verdict, which, however, after due consideration, was only strengthened in the view that Messrs. Boyle's was the best. Our only desire is that the best should win; yet we cannot but express our pleasure that this important prize remains in our 'sea-girt isle', as it should do, in the hands of the greatest ship-building nation the world ever saw. In our next number we hope to give a full description of this invention.

ON THE OPERATION OF THE PUBLIC HEALTH ACT.*

By WILLIAM HUGH HUGHES,
Medical Officer of Health, Ashton-under-Lyne United District, etc.

THE consolidation of the voluminous, and at the same time detached and isolated, statutes relating to the Public Health, some nineteen in number, by the Act of 1875, brought about a long desired reform in sanitary legislation. The desirability of a consolidation of these laws had long been generally acknowledged by those called upon to exercise sanitary functions, and it was anticipated, and not unreasonably, that its results would manifest themselves in the improved administration of sanitary law by Local Authorities, and the growth of knowledge with respect to it on the part of the general public. The Act was not merely a consolidation Act, it introduced many new and valuable amendments, the effect of which was to remove doubts which were continually arising upon the construction of conflicting provisions in the repealed statutes, and to give greater powers and obligations to the several Authorities intrusted to carry out the Act.

Upon this statute the powers and duties of all Sanitary Authorities now principally depend, and by it England is divided into sanitary districts, called respectively Urban Sanitary Districts and Rural Sanitary Districts. The Urban Districts were those previously constituted by the *first* Public Health Act passed in 1848, being generally cities and boroughs, the Corporations of which were appointed the Sanitary Authorities; and the Rural Districts were the areas of the Unions under the jurisdiction of the Guardians of the Poor, who were constituted the Rural Sanitary Authorities.

By this Act it became incumbent upon the various Sanitary Authorities to appoint a legally qualified medical practitioner as Medical Officer of Health, Inspector of Nuisances, and other officers for the transaction of the multifarious duties imposed by the Act. Amongst the subjects with respect to which the previous law has been modified are included:—(1) Sewerage and drainage; (2) privies, water-closets, etc.; (3) scavenging and cleansing; (4) water-supply; (5) regulation of cellar dwellings; (6) ditto of lodging-houses; (7) nuisances; (8) offensive trades; (9) unsound meat, etc.; (10) infectious diseases and hospitals; (11) prevention of epidemic diseases; (12) mortuaries, and other subjects too many to enumerate.

It would be next to an impossibility to deal, in an address of this nature, with all the subjects of the Act, or even, to any great length, with those just mentioned, and I do not propose to do anything of the kind, but to make a few remarks upon some of the greatest importance, dealing particularly with those subjects which are now attracting the attention of the medical profession and the public. Before, however, going into any subject, it is advisable to consider what statutory powers and statutory duties have been imposed upon Sanitary Authorities and their officials, a subject which is becoming daily of greater importance. Power is given by the Act to the Local Government Board, by Sections 42 and 299, to require defaulting Authorities to perform their duties; this power the Local Government Board has on several occasions exercised. In 1879 they required by Order the Corporation of Honiton to provide a proper supply of water, and the Horsforth Local Board to under-

* Read at the meeting of the Birmingham and Midland Association of Officers of Health, April 6.

take or contract for the removal of house refuse from premises and for the cleansing of earth closets, privies, ashpits, etc., and also to provide a proper system of sewerage and sewage disposal, and the Local Board had to borrow £22,000 for the purpose.

The Act of 1875 imposes duties which may be enforced by mandamus against defaulting Authorities. There are, it may be said, in the first place *powers* which may be regarded as permissive rather than obligatory; and in the second place *duties*, which must be considered as obligatory rather than permissive. It is the *duty* of all Sanitary Authorities to provide sufficient sewers and a proper supply of water for their district, for the Act says they *shall* do it. But it is also in the nature of a power, when the Act says they *may* do something, as for instance they may provide a hospital, or enforce the abatement of nuisances, or compel the paving of private streets. It must not be considered, however, that because an enabling power is given to an authority to do a certain thing that they may, or may *not*, do it at their discretion, for were the necessity to arise for the exercise of these powers, the powers would become duties, and losing their permissive character become obligatory, and the Local Authority would be liable to a mandamus if they failed to perform those duties; in other words, it is the duty of Local Authorities to use a *power* when the necessity arises; not only so, but it is incumbent upon them, according to a recent decision upon the point, to use all reasonable means to ascertain whether, and if so, when, there is any occasion for the use of their powers. To make this the more clear, supposing an Authority had not availed itself of the power to provide a hospital for the reception of the sick of its district and an epidemic broke out, it would then be its bounden duty to provide one without loss of time; or should an Authority neglect to enforce the provisions of the Act for the suppression of nuisances, and injury or damage was occasioned to others, the Authority would certainly be liable to a mandamus.

The tendency of modern decisions is to bring all Authorities as far as possible on to the same footing as individuals. It has been decided in a recent case that an Authority is bound to use all reasonable means to ascertain whether its sewers are in want of repair, they are bound to inquire and to inform themselves, and are not entitled to wait until they have been informed by others. There are many cases decided in which an Authority is liable in damages for negligence in carrying out its duties,* or in the use of its powers,† or for omitting to make a reasonable use of its powers,‡ or if it failed to learn when there is occasion to use those powers.‖ All these decisions go to show that Authorities stand in many respects in the position of an individual, and liable to the same incidents and consequences for its actions and neglect. It thus behoves all Authorities to be very watchful that their *duties* are rigidly performed without consideration of personal or private interests, and that in the same spirit their powers are so judiciously exercised as to meet the exigencies of the inhabitants of their own district. Matters of a public nature require treating in a bold and broad manner by local bodies having in view the benefit of the multitude and not of the few. The duties of such bodies are laid down in clear and precise words, and if such bodies are composed of reasonable men there should be no difficulty in carrying them out. The test is judicious discretion, the greatest danger their excess of zeal and an arbitrary exercise of their powers. My remarks must now turn into a somewhat different channel, and treat of the subject before us from a medical aspect.

As most of us are aware there is a Bill now in Parliament, the object of which is to provide for the better notification of infectious diseases, and its main provision is that 'every medical practitioner attending, or *requested* to visit and attend any *person* suffering from small-pox, cholera, typhus, typhoid, scarlet, relapsing, or puerperal fever, diphtheria, measles, or erysipelas (or other acute infectious disease included within the scope of this Act by order of the Local Government Board), shall immediately on becoming aware of the nature of the disease forthwith fill up, sign, and transmit, either personally or by post, to the office of the Sanitary Authority a certificate.' Then the Bill goes on to say, 'that if no medical man is called in, the notice is to be sent by the person in charge; the Sanitary Authority is to supply the forms of certificate, and for every form filled up by medical practitioner they are to pay a fee of 2s. 6d., except a further case breaks out or occurs within thirty days in the same house.' The penalty for neglecting to comply with the Act is £5.

A good deal has been said and a good deal remains to be said upon this subject. It is one that has created considerable uneasiness amongst the public, and anxiety on the part of the medical profession. It is only likely that it should be viewed with some suspicion, if not with alarm, when it is considered what its aim portends; it is the thin end of the wedge of a much more serious measure. 'Compulsory notification' means ultimately compulsory removal. 'Coming events cast their shadows before', and measures of this nature may not unlikely, but naturally, meet with some disfavour and prejudice, not only with the public, but with the profession generally. For what purpose, with what object, is notification of disease required? There is no difficulty in arriving at it; the answer can be found in what has been done in those towns in which compulsory notification is carried out, Huddersfield, Bolton, Burton-on-Trent, Jarrow, Llandudno, Notts, Warrington, Blackburn, Blackpool, Derby, Edinburgh, Leicester, Norwich, Rotherham, Lancaster, Oldham, Preston; and, I believe, Barrow-in-Furness, Birkenhead, Bradford, Lincoln, Reading, Salford, and Stalybridge have obtained legislative powers for the purpose in question. With the exception of Jarrow, where the fee is 1s., an uniform fee of 2s. 6d. is paid. What may be adduced in favour of compulsory notification is, that it secures to the Medical Officers of Health early information of the outbreak of infectious diseases, thus enabling them to take prompt measures for preventing its spread.

There can be no doubt that the working of this system of notification in detached districts has afforded valuable aid to the Authorities in checking the spread of infectious diseases. These local experiments have been watched with great interest, not only by the Corporations and Authorities of other towns, but by the medical profession generally, and also by the Local Government Board. It may indeed be said that the Local Government Board were anxious to encourage the practical working of this system, with the object of formulating general legislation on the subject. It is reported from most towns that the system has been all that could be

* Forbes *v.* Lee Conservancy Board.
† Scott *v.* Mayor of Manchester.
‡ Geddes *v.* Proprietors of Bann Reservoir.
‖ Fleming *v.* Corporation of Manchester.

desired, and that the only difficulties which have arisen were principally due to the opposition of the medical profession. Public prejudice has had to be surmounted, which is in all things a very difficult thing to accomplish, but these difficulties have diminished with the increased experience of the value of the system. In Bolton and Warrington it has been found necessary to take proceedings before the magistrates against medical gentlemen for neglecting to report cases of infectious disease, and the magistrates imposed a penalty for the offence in each case.

Acknowledging, as I must, that as a Medical Officer of Health my views are influenced by the undoubted value of the information obtained by the system of notification, I am not altogether led by such consideration. There can be no doubt that notification is of great value, and would be of greater value if followed by some means by which disease can be checked. Notification is practically useless, except for the purpose of knowing where disease has located itself, unless some power is given of interfering with its progress. To be told that disease exists in a certain house is a piece of useless information unless it is there isolated, or its spread prevented by other means. And let me call particular attention to the position of Local Authorities, including even those which now possess powers of compulsory notification. We all know that by Section 131 of the Public Health Act every Sanitary Authority is empowered to provide, for the use of the inhabitants of their district, hospitals or temporary places for the reception of the sick, and that when this provision has been made, any Justice may order the removal to such place of any person suffering from any dangerous infectious disease if he is without proper lodging or accommodation, or lodged in a room occupied by more than one family, or is on board any ship or vessel. So far so good; but how are the Local Authorities or their officers to find out whether a person is suffering from disease under any of such circumstances or conditions? I suppose you will say, by going to the house and making enquiries; but here we are met by the startling fact that you have no power to do it. The Act gives you no power of entry upon private premises. Neither the Medical Officer of Health nor the Inspector of Nuisances has any legal right, by virtue of his office, to insist on being admitted into private premises on the ground that he believes infectious disease to exist there. It is true that Section 102 of the Act provides that the Sanitary Authority or any of their officers *shall* be admitted into any premises for the purpose of examining as to the existence therein of any *nuisance*, but we all know very well that an infectious disease does not come within the meaning of a nuisance, as defined by Section 91.

This omission is of so serious a character, as to render the provisions of the Public Health Act, with respect to infectious diseases, practically inoperative should a person be aware of it, for he might safely shut his door in the face of everybody, and, with it locked, defy a whole host of Medical Officers, and everybody else of more or less importance. In fact, any person would be liable to an action for trespass and damages if he, under such circumstances, broke open a door, or forcibly entered any man's house, and it would be no answer to say that the law gave him power to enter to search for other matters, or that he entered for such purpose, unless it were the truth. No Court would admit such a jejune plea, or countenance the subterfuge, and he would have to take the consequences of his own rashness. So we come to this position—that compulsory notification, and even compulsory removal, are of no earthly service or utility unless power is given to make use of them; and the new Notification Bill certainly does not include such a power. I may be met with the statement that, under Section 134 of the Act, power could be obtained from the Local Government Board, who have power to make regulations whenever any part of England appears to be threatened with, or is affected by, any formidable epidemic, endemic, or infectious disease; but the Board has expressed an opinion that that Section is applicable only to Asiatic cholera or other unusual epidemics, and not to diseases ordinarily prevalent in this country. Whilst upon this point, I may point out another and perhaps equally serious omission from the Act. There is no legal power possessed, either by the Local Authorities or the Local Government Board, to enforce the closing of schools, against the will of the managers, on account of a local epidemic. One of the busiest propagators of infection is to be found in a public school, where children from every part of the town congregate. It is a difficult thing to estimate the dissemination of infectious disease through the medium of elementary schools, but it is widely admitted that it is one, if not the most profitable, source. These are serious omissions, and ought quickly to be rectified.

Turning our attention for a few moments once more upon the question of compulsory removal of patients to hospitals, a question which, sooner or later, will stir up war amongst us, let me ask, would such a measure be beneficial to the public whom it would be intended to benefit, and who would suffer were such a measure to pass? It is not so much of a question of doctors' theories, whether they support or oppose it, if it is proved that isolation in a public hospital will prevent the spread of disease. The power is now in the hands of several Authorities, and we are waiting for this information. Can it be proved that isolation in a hospital prevents the spread of disease? If it can, then the whole question is decided. The legislature would then not hesitate to enforce compulsory removal. Then would come the question, to what extent shall compulsory removal be carried out? Are the public ripe for the change? Have the stringent powers exercised by Authorities succeeded in checking the spread of the recent epidemics? How have these compulsory powers been received by the inhabitants? Have they not caused considerable discontent? It is said by some there should be no more objection to removal to an infectious hospital than to an infirmary. Both are provided as a special benefit for the patients, where they may be skilfully treated. It is admitted that a surgical operation is better performed at an infirmary than at a private house, and removal for such a purpose is never thought a hardship. It should be observed there is this distinction in the cases. In the one, the patient is removed for his own benefit; in the other, not only for the benefit of the sufferer, but also for the protection of the community, and there is no more hardship in the one case than in the other. May not other means of isolation be taken to prevent the spread of disease, viz., the treating of the sick persons at their homes, and the removal of the healthy from the infected houses to some public lodging-house, there to remain until their homes are certified by the Medical Officer of Health as being free from infection?

Before concluding, I must say power ought to be given to Corporations to disinfect clothes and premises, in certain cases, without giving the occupier the option of disinfecting; the prohibition of the supply of milk and provisions from premises, including shops, where infection exists; prohibition of the supply of books from libraries; prohibition of the retention of dead bodies in cases of death from infectious disease; prohibiting the deposit of infected matter in middens, ashpits, etc., without previous disinfection; prohibition of excreta from infected persons passing into the public sewers by the use of water-closets; prohibiting scholars and teachers from attending public or private schools who are residing in an infected house; power to close schools in infected neighbourhoods. I hope the time is not far distant when all cases of infectious disease will be reported to the Sanitary Authorities. At the same time, I am disposed to favour the view that this duty should be placed upon the householder rather than the medical man. Medical men can at all times, at the request of the householder, report the case, and receive their fee from the Authority for so doing.

SANITARY NOTES

ON MATERIALS USED IN CONSTRUCTING HOSPITALS, INFIRMARIES, AND PUBLIC INSTITUTIONS.

BY

A FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

II.—DAMP-PROOF MATERIAL.

IN our introductory article we referred to the importance of making provision against the ascent of ground air and damp into buildings where the sick and aged are housed, and adduced a few leading authorities in support of the view. We now propose to bring before the reader some of the methods employed and the materials used in the exclusion of ground air and the prevention of damp. The model bye-laws issued by the Local Government Board, as we have noticed, while providing that the whole site of a new domestic building shall be properly asphalted or covered with a layer of cement concrete at least six inches thick, may lead us to infer that the sites of hospitals and other buildings for the accommodation of the sick and aged are similarly treated, yet no provision exists in their case. It would not be difficult to add to the cases we mentioned in our last, and to show that many of our public institutions stand on sites which have been robbed of the clean gravel and sand, and are filled up by accumulations of animal and vegetable refuse. Cesspools and old brick drains, the contents of which have percolated the soil, are common sources of danger, and under certain states of the atmosphere, or by the agency of the heat of the building, give rise to impure emanations. Examination of the subsoil for buildings of this class is a highly important consideration. A high water level affects the air below buildings; the air is charged with moisture, which increases its avidity to absorb gases, such as carbonic acid, carburetted hydrogen, etc. Made soils are even more dangerous, and when vegetable refuse is present, there is the certainty of the generation of fetid vapours.

Before discussing the methods employed in preventing the ascent of ground air, we may incidentally refer to the well-ascertained relation existing between subsoil and disease. In the Report of the Medical Officer of the Privy Council for 1867, the general conclusions are, that high-lying pervious soils are more healthy than the low-lying; that on pervious soils there is less consumption than on impervious soils; and that, generally, sloping impervious soils are more exempt from that disease than the flat. While these facts are beyond doubt with respect to wet soils, there is evidence to prove that porous dry soils may be injurious to health. Rainfall, and especially barometric influences, cause a fluctuation in the ground air, which, under pressure, escapes, and naturally finds vent under the floors of buildings by virtue of the suctional action of warmth. We shall now refer to a few of the means which ought to be employed in preventing or checking these baneful influences.

1. Drainage is one of the chief considerations. It has been found that, for a building to be hygienic, the subsoil water ought not to be allowed to rise higher than 5 feet below the foundations. For this purpose, several lines of drain-pipes laid at this level, and discharging into a suitable outlet, are necessary, and these may be constructed in connection with areas round the walls, with a channel for carrying off the water from higher levels.

2. The most effectual safeguards are, the employment of impervious materials to check the rise of ground air, such as covering the site with a layer of Portland cement concrete, with a coating of asphalt.

3. The use of damp-proof courses in the walls, such as slate, vitrified materials, asphalt, and perforated courses of stoneware, to prevent the rising of moisture in the walls by capillary attraction.

4. The ventilation of foundations and basements below the ground floor, which may be effected by raising the ground floor above the soil, by dry areas round the walls, and by ventilating-bricks.

Omitting further allusion to drainage of sites which depend on local condition of soil and levels, we shall now confine the reader's attention to those materials of an impervious nature which best fulfil the object in view. Asphalt is the principal of these. Asphalts are either natural or artificial combinations of bitumen and calcareous matter, such as limestone. In natural asphalt the bitumen is more intimately incorporated with the calcareous ingredients; hence its superiority over artificial products. There are several varieties in the market. The most important of these are the 'Seyssel asphalt' (Claridge's patent), the 'Val de Travers', and the 'Limner asphalt'. The Seyssel asphalt is made from a bituminous rock at Pyrmont Seyssel, in the Jura mountains. The rock, a limestone, is impregnated with bitumen, and contains about 90 per cent. of carbonate of lime, and 10 per cent. of bitumen. The rock is ground, mixed with grit and with mineral tar in a heated state, until it is reduced to a mastic. It is then run into moulds or blocks about 18 inches square and 6 inches deep, and stamped on both sides with the words 'Pyrimont' and 'Seyssel'. There are three qualities sold, the fine, without grit, for floors; the fine gritted, used as a covering, a lining for tanks, and as a damp course; and the coarse gritted, used for pavements and rough purposes. The company supply directions for preparing the asphalt for use. After being mixed with mineral tar and kept well stirred, adding the asphalt in broken pieces by degrees, it is ladled out and poured over the concrete foundation or brickwork, and brought to a smooth face by wooden rubbers over the surface. The Val

de Travers asphalt, the product of a rock at Neuchatel in Switzerland, and the Limner asphalt, obtained from Limner, near Hanover, are similarly applied.

The importance of rendering the basements of houses impervious has brought asphalt into great request. In the building of hospitals and workhouses, the material has not been used to the extent it ought to have been. On all sites impregnated with moisture, refuse, and decayed matter, wherever, in fact, exhalations are liable to be produced, we should entirely cut off from the surrounding soil the basement, by a continuous bed of asphalt laid over the whole surface upon a bed of concrete 4 or 6 inches deep.

The great porosity of brick makes it equally desirable to interpose a layer of asphalt, half an inch thick, between two lower courses of brick of all external and internal walls. It may be shown by an easy calculation that a wall 100 feet long and 20 feet high, of one brick and a half in thickness, containing about 33,000 bricks, each absorbing about 10 per cent. of its weight in water, will suck in with the moisture from the mortar about 66,000 lbs. or nearly 7,000 gallons of water. A large proportion of this moisture is absorbed from the foundations, so that a newly-built house has to be dried out by the air, and the time occupied in this operation will depend on the hygrometric condition, or the saturation of the air with moisture, and its temperature. We have experience of cases where the moisture from foundations has been drawn up by capillary attraction to a height of 10 or 15 feet.

Damp courses are necessary, not only to prevent absorption of moisture from the foundations, but to check the percolation of damp downwards through brick chimnies and gables; and asphalte courses between the roof-covering and ceilings are desirable. The yielding nature of asphalte has established for this material a superiority over all hard and brittle substances such as slate and brick. We may also allude to Callender and Sons 'Pure Bitumen Damp-Course', as one of the best in the market. It is made of pure bitumen without the admixture of pitch or coal tar, which latter are apt to crack. Having practically tested this damp course, one can speak with confidence of its efficacy in checking the absorption of moisture. Pure bitumen sheeting sold in widths have been largely used for railway bridges and other structures, and for lining the walls of stations in cuttings, and for the roofs of underground buildings. Mr. Kirkcaldy's tests of this material are satisfactory proofs of its resistance to pressure for damp courses. It never sets hard, hence its value in buildings where a settlement may take place. The asphalt and felt courses are liable to harden and crack under pressure. In the tests made, the sheeting was placed flatways between bricks, two bricks on each side, and the results show that the material was as efficient after as before the tests. Blue Staffordshire bricks were used, and these were proved to a pressure of twenty-eight tons per square foot, and crushed at eighty-six tons. The damp-proof courses are made in lengths of twenty-four feet, so that overlaps occur very rarely.

Mr. E. Christian, in a recent paper, remarked upon the advantage of vertical courses of asphalte. It is often necessary to face an outer wall with asphalte or sheeting, as when it abuts against soil: and basement stories ought always to be so faced, if there are no dry areas around. In France, it is usual to set three or four courses of brick set in bitumen as a damp-course, and we have reason to believe this method answers well. In the recent Building Exhibition at Islington, Mr. White of Abergavenny exhibited a bituminous composition – the 'Hygienic Rock Composition'—employed to render brickwork impervious; walls and tanks are built in two thicknesses, and the preparation is run in a cavity between, about three quarters of an inch in thickness. A thoroughly dry wall has been formed on this plan, and the two thicknesses of wall are well tied together from the adhesive strength of the composition. The other damp-proof courses are slate, slag, vitrified courses of brick, and perforated stoneware. Courses of slate, bonded and laid in cement, are often employed, but unless carefully laid, are apt to get crushed. We prefer vitrified bricks, such as the blue Staffordshire bricks; these are largely used in the North of England. The bricks should be laid dry, so that the moisture of mortar joints may not impair their efficiency. Two courses, at least, ought to be introduced between the level of soil and the ground floor.

We have now to draw attention to slabs of perforated stoneware as manufactured by the Broomhall Tile Company, Messrs. Doulton, and also by Mr. Jennings. There are excellent substitutes for asphalt, and combine with a damp course the advantages of ventilation. The simplest of these form a series of square channels, which allows air to enter beneath the floor, and which serves not only to dry the wall, but to ventilate the basement and carry off ground air. The Broomhall Brick and Tile Company have carried the manufacture of these perforated courses of Mr. Taylor, the original inventor, to some degree of perfection.

Messrs. Doulton, of Lambeth, also manufacture grooved bricks of stoneware, with tongue and groove joints. Having referred to a few of the principal materials used in checking the absorption of moisture from damp sites, we now propose, in conclusion, to refer to the last of the methods we have mentioned for securing ventilation below basements of hospitals. We have a strong belief that the injurious effects of ground air below buildings of this class may be best insured against by raising the ground floors of the wards, so as to allow a free current of air underneath. This may be accomplished, by keeping them at least a foot high above the ventilated courses, the whole area of the site having been covered with a layer of concrete and asphalt.

One of the best examples of this principle of open basements or interception of the ground air, has been given in the elaborate reports prepared for the design and construction of the Johns Hopkins Hospital, Baltimore.* Mr. J. R. Niernsee, the architect, embodying the chief points of the opinions of several eminent hospital authorities of the United States, has made the wards one-storey brick buildings, on the pavilion principle, and built them on basements ten feet high, connected by a corridor, forming a terrace level with the ward floors. The basement floor is fixed at 112 ft. above tide. The basements are floored with asphalt.

When there are sunk basements, ventilation can be secured by dry areas. These may either be left open at the top or covered in, ventilation being obtained here and there by openings made in perforated stoneware. The bottom of area should be asphalted, and a channel left for drainage in the centre, the covering material being slate slabs. A

* See *Five Essays Relating to the Construction of Hospitals, contributed by their Authors for the Use of the Johns Hopkins Hospital of Baltimore.*. Sampson Low & Co., London.

brick ring or arch, by connecting the outer wall with the inner, is apt to draw in the damp, and all connections ought to be avoided.

The value of hollow walls need hardly be dealt upon; all authorities are agreed upon the importance of a cavity. For hospitals, impermeable walls have been questioned, as the impermeability checks the natural transpiration which is found to exist in ordinary walls plastered. We think the theory as regards hospitals is scarcely compatible with the necessity of securing non-infection, and may be met by proper ventilation of the wards. A coating of Parian cement or glazed tiles is now recommended for the inner wall surfaces of wards.

ON THE SANITARY PROVISIONS OF THE NEW EDUCATION CODE.*

By HENRY MAY, L.R.C.P.,

Medical Officer of Health, Manor of Aston Urban Sanitary Authority.

A LARGE part of the preventible disease and mortality of the country occurs among children during their school age, and their congregation together in schools is generally recognised by those who are engaged in sanitary work, as one of the principal modes of disseminating scarlet fever, measles, diphtheria, etc. Take the not unusual case of an infant school of five hundred children between three and eight years of age, one case of measles in the school exposes them all to the risk of infection. Every Medical Officer of Health has it brought home to him more or less, that through the working of our national system of elementary education, he experiences his principal difficulties in his efforts to isolate infectious diseases. As nearly five million children are attending public elementary schools in this country, and these are largely supported by the education grant, the conditions on which that grant is paid are a matter of great sanitary importance, and the sanitary provisions of the new Education Code deserve the careful consideration of Medical Officers of Health.

As in previous codes, a condition of payment of the grant is, that the premises are drained and ventilated and provided with suitable offices, and not crowded to a greater extent than eighty cubic feet and eight square feet to each child in average attendance in older schools, and in schools, built with the aid of a loan of public money, of about 100 cubic feet, or ten square feet to each child in boys' and girls' departments. In addition to these very proper precautions, an entirely new clause (98) is introduced, which meets the often expressed want, that there is at present no means of requiring a school to be closed in the presence of an epidemic. It provides, among the conditions required to be fulfilled by a school, in order to obtain the annual grant, that 'the managers must comply with any notice of the Sanitary Authority of the District in which the school is situated, requiring them for a specified time, with a view to preventing the spread of disease, either to close the school or to exclude any scholars from attendance, subject to an appeal to the Department, if the managers consider the notice to be unreasonable.'

In this clause, while the privileges of school managers are sufficiently protected, the duty is enforced on Sanitary Authorities of protecting health and life, even at the expense of some temporary interference with the machinery of elementary education. It is not at the request of the Medical Officer of Health that the managers are required to close their school, but he must first be able to satisfy a responsible public body as to the necessity for such a step, who will then serve the notice either to close the school wholly, or only against scholars coming from any particular locality, for a specified time. The school managers are farther fortified against any arbitrary proceedings, by the withdrawal of the grant being subject to appeal—not to the Local Government Board, which is the responsible department in matters relating to health, and might therefore be supposed liable to be prejudiced in favour of the Sanitary Authority—but to the Education Department of the Privy Council, which would naturally be supposed to be prejudiced in favour of School Boards and School Managers.

This Clause has, however, already provoked a considerable amount of hostility; notably, the School Management Committee of the London School Board have recommended its withdrawal from the Code. They say (see *School Board Chronicle*, April 1st, 1882, page 315):—'The Committee beg their Lordships to omit the new and unfortunate Article, placing the School Board under the control of the Local Sanitary Authority, as to the closing of schools during the prevalence of an epidemic disease. It would be extremely undesirable that the School Board should be placed at the mercy of a Local Authority full of prejudice, perhaps, against education, in the matter of the closing of their schools. We have never heard of any difficulty arising under existing circumstances. There is no reason to doubt that the School Boards would give reasonable consideration to any representations made to them by the Local Authority during the prevalence of an epidemic.' A great responsibility would certainly be taken by a Medical Officer of Health, in advising a Sanitary Authority to serve a notice to close a school, and the utility of such a step should be demonstrable. Although this may be easy in a rural district where the congregation of children at the school is the only means of communicating the infection, it is by no means easy in a crowded district where there are many other modes of conveying it. The advisability of closing one or more schools among a number of others in a town, is by no means frequently obvious, and must be judged of by the special circumstances of the case. The best means of preventing the wholesale spread of infectious disease among children, is diligence on the part of teachers and parents in keeping children from school who are suffering from it, or where it is in the house; but when the protection of healthy scholars is neglected by the school authorities, either through overcrowding, or through carelessness in allowing infected children to come to school, the important new power which is conferred by this clause will greatly strengthen the representations of the sanitary officers. Although at present, through the courtesy of school managers, the recommendations of Medical Officers of Health to close schools are generally attended to, in the future his advice and his representations will have a great additional weight, and his action will be very differently regarded by school managers, knowing that their school may be required to be closed in the ultimate resort. It is a means of enforcing deserved punishment, possessed in reserve by a disinterested public body, which is likely to awaken a true sense of responsibility, and check undue greed in school

* Read at the Meeting of the Birmingham and Midland Association of Medical Officers of Health, April 6th, 1882.

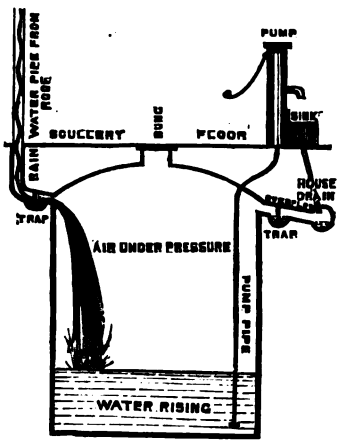
managers and their teachers, in cases where the health and lives of the children attending their schools are endangered through an outbreak of infectious disease.

UNDERGROUND RAIN-WATER TANKS, AND THEIR DANGER TO HEALTH.

By Henry Masters.

During the carrying out of the periodical inspection and certification of the sanitary condition of dwellings in Bristol and suburbs, which I started in 1880, I found that the water of a large proportion of underground rain-water tanks (which tanks are very general in this locality) was very foul, and about 60 per cent. of the whole tested were impregnated with ammonia, or sewage, some even contained dark yellow-coloured water; and in very many instances I discovered that rain-water was preferred for boiling vegetables, making tea, etc., which is supposed to give a better colour to the greens, and to increase the strength of the tea; this led me to investigate the cause of this large percentage of pollution, and the conclusion I came to was—

Firstly, that houses with windows overlooking gutters were in most instances subject to pollution, I assume by slops being emptied from such dormers, the gutters showing this unmistakably, both by their unusually rusty state, and also by deposits of hair, paper, and other matters in them. Secondly, by drainage and drain-air passing into the tanks, and mixing with the water, due, I believed, by the overflow being in direct communication with the house-drain, and this may be caused in three ways, viz., by the drying up of the overflow-trap water; by the



untrapping of the overflow-trap during the process of filling and emptying the tank; and also by occasional stopping of the house-drain, by dirt or kitchen grease, thereby allowing the drainage of the house to pass through the overflow-trap into the tank.

The accompanying sketch will illustrate my view of the action of water during its rise and fall in a tank, and the proof of my opinion may be easily tested, for if you put a bung loosely into the manhole cover, you will find that, during a heavy storm of rain, it will be forced up, *i.e.*, if the trap of the overflow has a water-seal, and then the question will be, which has the strongest resistance, the bung or the water-seal. If the bung be tight, the chances are that the overflow will be unsealed, and a free passage made for the entrance of drain-air into the tank, and to be absorbed by the tank-water. If the tank be properly ventilated, the untrapping of the overflow by the rise and fall of the water would be reduced to a minimum, but still you have the chance of contamination by drain-stopping, so that it is essential that all tanks should be well ventilated, as well as having overflows cut off from the drains, and so arranged as not to admit foul air.

In the experiments I have conducted in reference to the above subject, and they have been many, I have found that the rising of the tank-water acts as a piston, compressing the air above it into a smaller space, and when the air is sufficiently dense to force the overflow-trap water; it does so by its elasticity, and then the water is forced out of the trap in a body, and with some power, and the trap is left dry; and thereby the drain-air is free to pass into the tank, it is also actually drawn in to fill the otherwise vacuum, when the water is pumped out of the tank, so that a pressing and exhausting process is constantly going on, and under such circumstances no trap can be proof against its power.

THE
SANITARY RECORD.
MAY 15, 1882.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE ABUSE OF ALCOHOL.

In the *Deutsche Vierteljahrschrift für Öffentliche Gesundheitspflege* is reproduced Dr. Baer's address on the Abuse of Alcohol, delivered last September at the ninth annual meeting of the German Society of Public Health, held at Vienna.

It would be quite impossible in the space at our disposal to give even an analysis of the contents of this most learned, exhaustive, and impartial essay. It teems with references to the literature of the question in every language, and with vital, criminal, and economic statistics of every country in Europe (except Spain, Portugal, and the Trans-Danubian States), and of the United States of America.

Dr. Baer is no rabid teetotaller—he asserts the value of the lighter wines and beers under certain circumstances, and the comparative harmlessness of even a liberal indulgence in these beverages; but he is unsparing in his denunciation of every form of spirits. He shows, by an irresistible array of statistics, that the terrible effects of alcoholism on the health of the individual and his progeny, and on the morals and well-being of the community, are in direct and constant ratio to the consumption of

spirituous liquors, the part played by wine and beer being relatively insignificant.

The autonomy of the constituent States of the German and Austrian Empires gives a special value to their statistics, the wine-producing and beer-consuming provinces of Germany contrasting most favourably with the spirit-drinking Polish districts of Eastern Prussia; while the habits of the heterogeneous populations of Austria are as diverse as their racial characters.

Dr. Baer discusses in order the effects of alcoholic excess on the several organs of the body, its bearings on insanity and longevity, and on the viability and health of the children of persons addicted thereto. He shows that murder, assaults and crimes against the person, and suicides, prevail everywhere directly as the consumption of spirits, rising and falling with it, even in such homogeneous populations as that of France. The most striking example of this was given by Ireland, where, through the exertions of Father Mathew, the consumption of whisky fell during the five years 1838-42 fifty per cent.; the crimes of violence falling from 64,520 to 47,027, and the executions from fifty-nine in the first year to one in the last. Scarcely less valuable are the criminal statistics of the several provinces and States of Germany and Austria.

The mutual relations of drunkenness and pauperism, each acting as cause and effect and aggravating the other, are fairly discussed, and illustrated in like manner.

In considering the remedies, legal and social, preventive, repressive, and penal, Dr. Baer shows, from the experience of countries where no restrictions are imposed on the manufacture of spirits, that the number of distilleries has no effect on the production or consumption. In Gallicia, 518 distilleries produce 10,000 hectolitres, while in the Tyrol, 9,782 make but 5,600; and the suppression in Sweden of 173,000 private stills had no effect on the consumption of spirits. The chief evil of the private distillery is that the product is more highly charged with fusel oil, which intensifies all the ill effects of alcohol.

He advocates the imposition of the heaviest possible duties on spirits, so as to place them if possible beyond the reach of the poor, except as medicines. At the same time, he would encourage the consumption of wholesome beverages, by reducing the taxation of beer and light wines, and abolishing all duty on tea and coffee. Though penal laws are useless for the reformation of the drunkard, they may act as deterrents to others, and should be especially enforced in the army and other branches of the service of the State.

But in the limitation of the number of houses for the retail sale of intoxicating drinks we have the most effectual of legislative remedies. True it is that the confirmed drunkard will not be influenced by any impediments in the way of obtaining his indulgence; but equally true it is that the removal of ever present opportunities and temptation would save thousands from falling into habits of intemperance. No one can pretend that the countless drink shops in every town represent the real needs of the population; and there is no doubt that, could their numbers be reduced to anything like that of butchers and bakers, and retail sale on credit prohibited, the effect on the common forms of drunkenness would be immense. Dr. Baer adduces the case of Gothenburg, where, since a Company bought up the spirit shops, reducing their number from 61 to 35, prohibiting credit, and handing over all the profits to the Town Council, thus taking away all inducements to 'push the business', the charges for drunkenness and the cases of delirium tremens have been reduced to one-third of what they were before. In Belgium, on the other hand, between 1838 and 1868 the number of retails increased from 45,000 to 96,000, and the consumption of spirits from 4.42 to 11 litres per head.

In the same way, *i.e.*, removing the temptation, will drunkenness be lessened by limiting the hours of sale on Sundays. In Germany, where there are no such restrictions, 32 per cent. of murders and crimes of violence are committed on Sundays, and 58 per cent. on Saturday and Sunday, the idle days of the working man. In Scotland the Forbes Mackenzie Act has been followed by a considerable diminution in those offences.

Dr. Baer, in common with many of the leading physicians of Germany, views the establishment of asylums or homes for inebriates (not only for such as can pay, but for all classes), as a movement of the highest importance, only he would have the magistrates empowered to commit the habitual and repeatedly convicted drunkard thereto, as juvenile criminals are to reformatory schools.

The question of intemperance in the army is treated at some length, the territorial system of Germany again affording interesting data; and the remainder of the paper touches on such social enterprises as coffee palaces, temperance societies, temperance school books; the influence of the clergy, medical profession, teachers, and that more or less possessed by every member of society, which might and must be exerted, individually and collectively, in staying the advance of this root of every evil.

THE SMALL-POX EPIDEMIC IN NOTTINGHAM.

In a recent report submitted to the Health Committee of Nottingham, the Medical Officer of Health describes the progress of the epidemic of small-pox from which that borough has suffered, and which has, unhappily, not yet died out. Beginning in the last week of November of last year, the epidemic, although it has never reached serious proportions, has yet gone steadily on, and at the date of the report the number of new cases reported weekly remained the same as it had been six weeks previously. During the five months, Dr. Seaton estimates, 195 cases have oc-

curred; '175 have been officially notified, ten others were known to have occurred in the months of December and January, and about ten others may have occurred in the five months, of which we have had no knowledge whatever.' Of these cases, 133 were treated in the Garden Hospital, and the number of deaths in the hospital was 17, giving a mortality of only 12.7 per cent. Of the 133, no less than 18 were unvaccinated children under fifteen years of age, and only four (excluding two cases in whom the disease, if it existed at all, was so very mild as to be unrecognisable), were vaccinated children under the same age. Of the 18 unvaccinated children all save one had the disease severely, and 8 (44.4 per cent.) died; while of the vaccinated children, only two of whom had good vaccination marks (a boy of thirteen and a girl of eleven), none died. Of the other 112 patients, some of whom were unvaccinated, none had undergone re-vaccination. These facts not only confirm the protective power of vaccination well performed, up to a certain period of life, but also 'make manifest the absolute necessity for re-vaccination amongst adults.'

The bulk of the cases, it appears, occurred in two principal groups, of forty and thirty cases respectively, and three or four smaller ones. The second of the two principal groups happened to be in the vicinity of the Garden Hospital, and hence many people have rushed to the conclusion, just as has been done in respect of the hospitals of the Asylums Board in the Metropolis, that the hospital was the chief cause of the outbreak near it. 'The statement which I have heard commonly made', reports Dr. Seaton, 'is this, that the cases have occurred hitherto in the immediate vicinity of the hospital, and in the direction of the prevailing wind, the theory advanced being that the germs or contagia of small-pox are thereby conveyed to a distance.' If this were the case, of course it would follow, that many people would be attacked at the same time in the same direction. But this, it is pointed out, was not so. On the contrary, the cases in this group which appeared in the vicinity of the hospital, occurred one after another at irregular intervals. Moreover—not to mention several eccentric manœuvres which, if the theory be true, we must suppose the contagia to have executed—the true origin of this particular group is probably to be found in a few primary cases, which were obviously not due to the hospital, just as the forty cases of the other large group, at a distance from the hospital, were traced to a single unnotified case. 'In fact', Dr. Seaton concludes, 'had the Small-pox Hospital been on Mapperley Hill, which I have heard spoken of as an eminently suitable place, I cannot see any reason for doubtlng that these same cases would have arisen in the same houses, and at the same time'.

The report closes with some suggestive remarks on the advantage of the notification of infectious diseases, which has been in operation in Nottingham for over two months. By its aid the first cases in many districts were made known to the authorities, and were then isolated; and what might have proved formidable outbreaks, were thus in some instances nipped in the bud. Altogether, too, the epidemic, although it has not been subdued, has been kept within comparatively narrow limits. Speaking of some cases in neighbourhoods in which the disease would readily have spread if left unchecked, Dr. Seaton says:—'Without the early knowledge of these and other cases, it would have been a sheer impossibility to have confined the disease within anything like its present comparatively narrow limits. In fact, had preventive measures been withheld, there is no doubt whatever that the disastrous events of 1871 would have been repeated; that ere now the sick might be counted by hundreds instead of tens; the dead by scores instead of units.'

What has prevented the Health Authority of Nottingham from effectually stopping the progress of the epidemic, has been the inability to procure isolation of all the cases. Many patients suffering from small-pox have refused to go to hospital, and have thus remained centres of infection. At the date of the report, there were no less than seven patients who remained at home. Until such perverseness on the part of a portion of the community ceases, there can, we fear, be no prospect of the disappearance of the disease. Small-pox cannot be effectually stamped out, so long as cases are kept at home, freely mixing with their neighbours during the stage of convalescence. It is evident, therefore, that notification alone will not avail; there is required also not only the means of, but the power of enforcing, rigid isolation.

EDUCATIONAL OVERWORK IN GERMANY.

IN the *Centralblatt für Allgemeine Gesundheitspflege*, Dr. F. W. Fricke inveighs against the growing evil of long hours and excessive study imposed on the pupils of the German gymnasia. We may remark, in passing, that the whole educational system of Germany is more uniform than ours, and is directly under State control. The Volkschulen correspond to our public elementary schools; the Gymnasia, established in every important town, and which are almost the sole portal to the Universities, find their nearest analogues n our great 'public schools', and, like them, are essentially classical; while the Realschulen resemble the so-called 'modern' schools recently opened in connection with many of the former. Dr. Fricke shows that while modern languages and natural sciences have been rightly enough introduced into the curricula of the gymnasia, it has not been by a process of substitution; on the contrary, the advance of philological science has greatly increased the labour attached to classical studies; and that the teachers have found that their only resource lay in a constant addition to the home lessons. The Ministers of Instruction, Drs.

Falk and Puttkamer, indeed, endeavoured to stay the evil by prescribing a limit to the home work, varying from ten to twenty-four hours per week, with the age and class of the boys; but this leaves from ten to twelve hours daily of close study, in or out of school, the consequences of which cannot fail to be injurious to the mental and bodily welfare of the young.

Two years ago, Dr. Hasse read and afterwards published a paper, in which he asserted that he had observed numerous instances of mental disease among the pupils of both sexes in the higher schools. So bold a statement did not long remain unchallenged; but the right line has been taken by Drs. Snell and Finkelnburg, who show that it is not actual insanity that we may expect to find in early life, however much its later appearance may be favoured by these causes, but vaguer nervous symptoms, headaches, mental and physical lassitude or irritability, and a disinclination to the pastimes and exercises natural to childhood and youth.

Another and more palpable result is the extraordinary increase of short sight, shown by statistical enquiries, and this notwithstanding the efforts of the authorities at a better arrangement of school construction, lighting, and furniture. In the gymnasia of Baden the percentage of sufferers from myopia in the several classes, from the lowest to the highest, was found to be 4, 20, 28, 35, 55, and 65. Again, in the village schools, the percentage was but 1; in the elementary schools in the town, 6; in the middle schools, 10; the Realschulen, 10; in the Gymnasia, 26; and in the Universities, 60-70!

These are facts to which it is impossible to close one's eyes: the urgent question is how such grave results are to be obviated. To this Dr. Fricke has but one answer, viz., the abandonment of Greek and Latin as compulsory subjects of education and as obligatory on all who seek admission to the Universities. In terse and telling argument he meets and refutes the assertions of those who maintain that classical studies so-called are essential elements of moral and mental training, and of intellectual culture, vindicating, at the same time, the claims of modern classics, natural science, logic, and mathematics, to at least equal value as means, and incomparably greater worth as ends, of education, whether general or professional.

THE OBJECTS AND ADVANTAGES OF RAILROAD SANITATION.

A PAPER on this subject, by Dr. S. S. Herrick, was read at the Savannah meeting of the American Public Health Association, 1881. The paper is an important one, serving to point out the responsibilities attaching to railway companies in the matter of public health and safety, and also the many shortcomings of our own 'common carriers' in these respects. It need cause no surprise that the author finds plenty of work for the sanitary broom of the present day on our great railway systems. Appropriate objects, he considers, for a railway sanitary system are the following: 1. A surgical and medical service, properly organised, for the relief of injured passengers, and for the medical attendance and supervision of the servants. 2. The physical examination of all who enter the service of a company, with the view of excluding from responsible posts those who have defective sight or hearing, or are the subjects of diseases of the great viscera. 3. The inspection of the sanitary condition of passenger coaches, of grounds, and buildings. 4. A meteorological service, affiliated with the national signal service. 5. To guard against the danger of infecting railroad coaches, whether those used by man or by the lower animals, and those also for baggage and merchandise, and so prevent the spread of contagion from one point to another. 6. To confer with national and local sanitary authorities, with the view of obviating restrictions on travel and traffic, and for representing the companies in sanitary and quarantine consultations wherever their interests may be affected.

The advantages of many of these recommendations are sufficiently obvious, though it must be said of some that they are less applicable to our own companies than to those of the great American Continent, where journeys are necessarily much longer, and where the servants are subjected to greater risks from exposure, from deprivation of food, and from passing through malarious districts. The efficiency of servants is in the main a question of the labour market, though it cannot be doubted that 'the efficiency of men in any organisation is in direct relation to continuity of action. Interruptions by sickness are among the most common and the most serious of disturbing causes. To reduce these to a minimum, and to secure with the least possible delay the return of trained *employés* to their familiar duties, is an object of great importance. The certainty of having medical relief within reach at all times would operate powerfully in producing contentment and regular continuance in their occupations.' The expense, however, attending it will, we fear, stand in the way of the immediate supervision of the health of their servants being undertaken by railway companies.

Much has been said and written during recent years upon the physical examination of men entering the railway services. The importance of excluding all the colour-blind, for example, cannot be overrated; and although legislation has not yet made this compulsory, the railway companies of this country, we believe, are far more careful in this respect than is commonly supposed.

Not less important for the general safety of the community is the recommendation for the sanitary inspection of railway carriages. Here, it seems to us, there is much room for improvement. There is nothing whatever, so far as we know, to prevent a person in the infective stage of some disease travel-

ling from one part of the country to another, and subjecting those who meet him on the way, and those who travel in the same carriage after him, to the risk of acquiring the same disease. These remarks are not less applicable to the transport of animals affected with contagious diseases. It is too much to expect, as the author of this paper says, that the ordinary officers of a company could be depended on to recognise and ward off all dangers of this kind; and the work should be undertaken by competent sanitary inspectors at the most important stations.

The adoption, however, of any one or more of these recommendations depends very largely on the matter of expense, and so long as the half-yearly dividend is the chief end of the thought and the labours of directors, so long will the sanitary responsibilities of railway companies be avoided, unless, indeed it should appear to them that increased regard to sanitation in their systems is, in the long run, the wisest policy, and most likely, in a financial point of view, to bring about the best returns. This is a matter, indeed, not lost sight of by the author, who says that every feature of the proposed sanitary service is designed to 'secure the companies against pecuniary loss: 1. By reducing the cost of actual disasters to the lowest amount; 2. By adopting precautions to obviate disasters; 3. By preserving the health and securing the efficiency of *employés*; 4. By avoiding the stigma of "common carriers" of contagion and destroyers of live stock, with its incidental losses. 5. By obviating interruption of business, through quarantine obstructions, and expensive law-suits for damages to person and property.'

'In the rivalry of numerous and competing routes, managers are wont to boast of the advantages which they offer in respect to economy, speed, comfort, and even safety. Liberal expenditures are made to promote speed and comfort, in the confident expectation that they will be returned in augmented business receipts. It is certain that much might be done for promoting safety in the manner indicated, and that the public might be invited to appreciate the offer through the usual advertising mediums. There is good reason to presume that many would be sensible to such an inducement, and give preference to the safer pathway. Thus the premium on the insurance would be returned, and the saving of life and property would be clear gain.'

The town of Christchurch, New Zealand, is being drained at a cost of about £250,000, £200,000 of which have been already spent. The system of drainage consists of street channels and drains for surface and storm water, and a separate system of sewers for sewage, which will be conveyed to a pumping station, when it will be raised to a higher level, carried to sand hills, and disposed of by irrigation and filtration.

The annual consumption of white lead in the United Kingdom is estimated to exceed 150,000 tons; and this notwithstanding the recent enormous increase in the consumption of paints made from zinc, or other basis than white lead.

THE METROPOLIS MANAGEMENT AND BUILDINGS ACTS (AMENDMENT) BILL.

A BILL with this title has been introduced into the House of Commons by Sir James Mc'Garel-Hogg, Sir John Hay, and Sir Andrew Lusk, for conferring further powers upon the Metropolitan Board of Works with respect to the management of existing streets and the formation of new streets, as well as for the regulation of buildings and structures in the Metropolis. It gives power to the Board of Works to name and number streets in default of the local vestry or district board complying with their order, and to prevent obstructions, such as posts, rails, bars, or other encroachments, in, upon, over, or under any street. It also gives power to prevent the laying out of new roads, passages, or ways that will not afford direct communication between two streets, and to restrict in certain cases the laying out of streets for foot traffic only. The Board may prescribe and enforce conditions as to the space to be left open where a building is proposed to be erected beyond the general or regular line of building, and may exercise the powers of vestries and district boards, under the 75th Section of the Metropolis Management Amendment Act, 1862, with regard to such buildings.

The Board may impose a condition requiring the removal, within a specified period, of iron or other buildings of a temporary character, the erection of which they may sanction. No temporary or movable wooden structures are to be erected without a license from the Board. The conversion of houses into public buildings must be performed to the satisfaction of the district surveyor. The restrictions heretofore imposed with respect to the distance at which pipes for conveying hot water may be placed from any combustible materials are not to apply in the case of pipes for conveying hot water at low pressure. Where a building is ruinous, or so far dilapidated as to have become unfit for occupation, the Board may make complaint to a justice, with a view to an order being made on the owner or occupier to take down, repair, or rebuild the structure. The Bill makes other provisions for better securing the payment to the Board of expenses incurred in respect of dangerous or neglected structures, as to summonses and notices in the case of such structures, and as to the settlement of differences between a building owner and adjoining owners.

The most important clause, from a sanitary point of view, is, however, that regulating the open spaces about dwellings. We reproduce this *in extenso*. 'Every new building begun to be erected upon a site not previously occupied, in whole or in part, by a building after the passing of this Act, intended to be used wholly or partly as a dwelling-house, shall, unless the Board otherwise permit, have directly attached thereto, and in the rear thereof, an open space, exclusively belonging thereto, of the following extent: where such building has a frontage not exceeding 15 feet, the extent of the open space shall be 150 square feet at the least; where such building has a frontage exceeding 15 feet, but not exceeding 20 feet, the extent of the open space shall be 200 square feet at the least; where such building has a frontage exceeding 20 feet, and not exceeding 30 feet, the extent of the open space shall be 300 square feet at the least; and where such building has a frontage exceeding 30 feet, the extent of the open space shall

be 450 square feet at the least. Every such open space shall be free from any erection thereon above the level of the ceiling of the ground floor storey, and shall extend throughout the entire width (exclusive of party or external walls) of such building at the rear thereof. The provisions of this enactment shall be in addition to, and shall form part of, the rules of the Metropolitan Building Act, 1855, and the said Act shall be construed accordingly.'

NOTES OF THE MONTH.

THE INFECTIOUS DISEASES NOTIFICATION BILL.

Believing that to be aware of the current of feeling on the part of Medical Officers of Health in relation to the Infectious Diseases Notification Bill may be useful and interesting to our readers, we continue our gleanings on the subject from the Reports which are forwarded to us.

Dr. Sedgwick Saunders, in his report on the sanitary condition of Middlesex and Hertfordshire Combined Sanitary District, writes in opposition to the measure. 'With reference to the Infectious Diseases Notification Bill, I would say that as at present drafted, it imposes the duty of reporting to the Sanitary Authority on the medical man called in to attend any case of infectious disease. This is a most unjustifiable interference with the confidence which has always existed between the public and the medical profession. The duty of reporting should, as it does in the case of registering a death, devolve on the householder or person in charge of the patient, the nature of the disease having been certified to him by the medical attendant. I hope that anyone that may have any influence—and the county members certainly have—will exert it to prevent this unwarrantable and totally unnecessary interference with the relations of medical men and their patients. The returns of infectious sick which this bill provides for will be of great value; even now the returns of pauper sickness, which by the way, I only receive from two Authorities, are very useful in directing my attention to districts in which infectious disease occurs.'

Dr. Goldie, in his last report on the sanitary condition of Leeds, commenting on the recent outbreak of small-pox in that town, states that he has been forcibly struck with the number of persons who have caught the disease, who have little shops as their business places. He accounts for it in this way: that there are, and have been, cases, either suffering, or persons infected, going about the streets and shops, and communicating the disease to others. This, in Dr. Goldie's mind, only goes to show the pressing necessity for the immediate notification of all dangerously infectious diseases. He proceeds to remark that most of the objectors to this principle are those who oppose all restrictive laws, which they please themselves by calling oppressive legislation, interfering with the liberty of the subject. So far they are correct; but, then, the law demanding the registration and correct record of every birth, death, and marriage is no more restrictive or oppressive. The medical advocacy of the early notification of infectious diseases is a proof of its wisdom, and of the unselfishness of the profession. Dr. Goldie says that for his part, he would much sooner be engaged and paid for keeping a population free from diseases, than for curing them of diseases which are preventible by timely advice. Such terms would place the profession of medicine, and the recipients of its advice, upon a better and more honourable footing. Who is there, he continues, 'either in the profession or out, who would like to be charged with standing coolly by and seeing a blind man walk directly into the line of a passing express train. We should shudder at such an imputation; and yet we see people in every grade of life permitting ignorant persons daily to walk blindfold into the jaws of infectious diseases, and allow them to incur the penalty of death or disfigurement for the remainder of their lives. The mortality from the seven principal zymotic or preventible diseases for the period of one month will exceed all the deaths from all accidents in Leeds for the period of one year; and yet we are, from some mere prejudice, omitting to use the best known signal of danger, viz., the immediate notification of all infectious diseases to the proper authorities. Local legislation in so important a matter is too limited in its results to affect a question like this. Imperial law is what we should have, affecting all persons alike. If it should become law, all must be subject to the law to the same extent exactly. It has been argued by some of our qualified medical men that such a law would open a wide door for quackery. If our present Medical Act is not potent enough to put a stop to empirical practice, then I should have a new Medical Act at once to meet the case.'

Mr. Blandford, the Medical Officer of Stockton-on-Tees, in his report to his Authority, brings under their notice the necessity of compulsory registration of infectious disease, since they at present only receive notification of outbreaks officially in cases of death, and those occurring amongst pauper patients. He calls their attention to the urgent necessity of steps being taken to check the spread of infectious disease immediately on its outbreak, and before the centres of infection have had time to accumulate. He vividly illustrates the utility of such a compulsory system by the Contagious Diseases (Animals) Act, where compulsory notification leads to isolation, and steps being taken which at once stamp out the disease from a district.

Mr. Iliffe, in his report for the city of Derby, gives a full account of the working of the Compulsory Notification of Infectious Diseases Clauses in the 1879 Act, which we reproduce as a practical and interesting contribution to the consideration of this important question. He writes that he is now able to add a second year's experience, and that his further acquaintance with the operation of this clause has lent additional weight to his previous opinion, that they are of immense importance and value to the inhabitants of the Borough. They may be considered the foundation of the principal sanitary work carried out; at all events, they usually furnish the ground for the initial action in most necessary and sometimes most radical changes. Without the notification of infectious diseases it would often be impossible to convince owners and occupiers of property that illness, and perhaps death, were lurking in their dwellings, in the shape of evils unseen by those untutored in sanitary science. The general public are now tolerably well aware of the existence of the Act, and fairly well acquainted with its provisions. To enable them to become conversant with its several powers, printed notices and handbills were lavishly circulated amongst all classes when the Act was first put in force, in December 1879, and no plea of ignorance would now be accepted as a defence for neglecting to comply with it. The inhabitants

also by this time fully aware that in cases in which medical men are not called in to attend infectious diseases requiring notification, they themselves must supply the information. The medical men of the Borough were informed by circular of the powers conferred upon the Sanitary Authority by means of these clauses, and of its intention to carry them out. Books containing forms of certificates, with foot notes for guidance, were sent to them, and other *vivâ voce* explanations and information given where necessary. The progressive steps in the operation of this Act are as follows: A certificate is received at the Sanitary Inspector's office that a case of infectious disease exists at a certain house. As soon after as possible, the infected house is visited by the Inspector, who procures all information about the case, the number of adult persons and of children in the house, their different habits and occupations; the condition of the house, its drainage, closet accommodation, water-supply, and ventilation. The information thus procured is laid before the Medical Officer of Health, who gives instructions according to the different aspects of each case. As a rule, the Inspector can tell what those instructions will be, as his daily experience of these matters has made him well acquainted with the usual mode of procedure. Consequently, he acts upon his own responsibility to save time, and looks to the Medical Officer to endorse his actions, and, in case of difficulty, to have the matter referred to him. In the great majority of cases no difficulty arises that the Inspector cannot deal with, but when one does, the Medical Officer usually solves it without much trouble. For instance, the Inspector may find it impossible that proper isolation can pertain to the house in which a case of scarlet fever exists, and he advises the removal of the case to the Infirmary, which is objected to. In such a case the Medical Officer intervenes, and in 99 cases out of 100, successfully. By conducting the business in this way, the sensitiveness of private medical practitioners with regard to interference with their patients is obviated, and the smooth working of the Act, as far as they are concerned, ensured. By proceeding in this fashion, a house-to-house inspection has been gradually and effectively carried out in Derby, and usually with the result of finding some glaring defects in the sanitary arrangements. These were remedied by the serving of notices upon the owners of the premises in fault, and no further process has been, as a rule, involved. Where necessary, however, further proceedings have been instituted before the Magistrates, with the inevitable result in every case of an order being made by them for the defects to be repaired. During 1881, the following certificates of infectious cases were received, and they revealed the existence of a still further number of cases, to the extent indicated in the subjoined table:—

Particulars of Certificates and Cases of Infectious Diseases during the year.

	Scarlet Fever.	Typhoid Fever.	Small-pox.	Diph-theria.	Typhus Fever.	Puerperal Fever.	Total.
Certificates	202	77	39	6	1	6	331
Cases	423	95	46	6	1	6	577

Each of these cases received on an average nearly four visits from the Inspector. Many of the houses visited contained, of course, two or more cases, so that the number of visits to each house would really be above four. Altogether, 2,184 visits were made, and 466 rooms were fumigated. As the number of certificates was 331, the cost to the Borough for the year in certificates was £41 7s. 6d. One medical man was fined by the Magistrates for preferring to act upon his own principles rather than according to law. The patient's friends were in the first instance the informers, backed up later on by the death certificate. One householder was also fined because of not notifying a case of scarlet fever, no medical man being called in; inadvertence was pleaded, but a fine was imposed. With these two exceptions, Mr. Iliffe remarks that everything connected with the operation of the Act has been an unqualified success, and that it would be difficult to find any law requiring a certain amount of restraint, and of individual self-denial, which has been carried out so well as this enactment.

Dr. Alfred Hill, the Medical Officer of Health for Birmingham, in his elaborate report on the health of Birmingham for 1881, says that the want of early and full information as to the existence of infectious diseases, and the consequent inability to take precautionary measures against the spread of infection, is a very serious obstacle to the work of arresting preventible disease. It is true, he owns, that a certain amount of such information is obtained, but the reports are entirely voluntary, they are received in only a very small number of cases, and from only a few of the medical practitioners of the town. The results, therefore, fall very short of what is desirable. Dr. Hill remarks, with reference to the Bills to be introduced into England and Scotland, to provide for the notification of infectious disease, that it is to be hoped that these general bills may pass, as much time will be thus saved, and uniformity of working be secured. A general bill would decide at once upon whom should fall the responsibility of reporting to the Sanitary Authority.

Mr. Harris Butterfield, the Medical Officer of Health for Bradford, reports that the Section of the Bradford Act relating to the compulsory notification of infectious diseases came into operation on July 16th, 1881, and that it has worked exceedingly well, and has enabled him to deal with a severe outbreak of scarlet fever in a satisfactory manner.

SERIOUS OUTBREAK OF INFECTIOUS DISEASE AT GATESHEAD.

The report presented by the Medical Officer of Health at the last meeting of the Gateshead Town Council was of a very unfavourable character, and showed that typhus fever and small-pox prevailed in certain districts of the town to a somewhat alarming extent, the death-rate during the month reaching the average of 32.8 per 1000 per annum. Much of the fever had been traced to one infected house, from which the disease radiated throughout the adjoining streets. Towards the end of the month the fever exhibited symptoms of decline. The Town Improvement Committee presented a special report, wherein they strongly recommended the ventilation of the sewers. The ash-pit system in use was also referred to as a source of disease, as were also two wells, situate at the outskirts of the borough. Mr. Councillor Lucas said that it appeared to him, that at least forty of the deaths which had occurred during the month were due to preventible disease. It is satisfactory to learn that the Corporation are taking steps which, it is hoped, will prevent the recurrence of the above unusually high death-rates.

STIMULANTS IN WORKHOUSES.

Dr. Wearne the Medical Officer of Helston Workhouse, has created a considerable sensation amongst Union officials, persons who take an interest in the alcohol question, and Parish Medical Officers, by the small dimensions to which he has reduced the drink bill of the establishment to which he is attached. It must be premised that Helston Workhouse receives the whole of the paupers, excepting those having out-door relief, from sixteen parishes, which contain a population of about 25,000. In 1879 the number of inmates was 159; 1880, 149; 1881, 149. About forty of these are children, and the twelve beds in the Infirmary are generally occupied by young women suffering from various ailments. The other inmates are old and more or less invalids when they seek the shelter of the house. From such a household the death-rate would naturally be high, and the establishment must be almost looked upon as a hospital when considering its sick list and death returns. The deaths in the years given were respectively 21, 21, 15. When Dr. Wearne was appointed Medical Officer, twelve years since, he found what is still the practice in many other workhouses—gin, beer, and other beverages of a similar character, daily given out to many of the inmates. Without cutting off the supplies from those who were thus habitually accustomed to the allowance, the doctor determined to treat new comers differently. While dispensing with alcoholic drinks, which, of course, had only been used for their stimulating properties, he determined to substitute stimulants of a more abiding and sustaining nature. Milk is now freely used, while sugar, sago, cocoa, and corn-flour are supplied in extra quantities, much to the benefit, as well as, it is affirmed, to the satisfaction of the inmates of the Workhouse. And now comes the Helston Union liquor bill. In 1879 the drink consumed in the house cost the ratepayers 12s. 4½d.; 1880, 7s. 3d.; 1881, 7s. 4d.; or in three years a total of £1 6s. 11½d. The Falmouth Union shows a still smaller consumption of alcoholic stimulants, as the drink bill amounts for the year ending March 25, 1882, to the grand total of 9½d., the alcoholic stimulants which cost this large sum having been given as medicine in three extreme cases. In 1881, this item of expenditure amounted to 19s. 11½d. But because the drink bill is infinitesimally small, it must not be supposed that Falmouth Union is of correspondingly diminutive proportions. It consists of ten parishes, the population, in 1871, being 25,198. In 1880-81 the average number of inmates was 136, and in 1881-82, 125; and the number of deaths for these years was respectively 21 and 6. The point, however, upon which special stress should be laid is that there are 34 beds, generally full, in the Infirmary, in addition to those in the Infectious Hospital, and that, therefore, Mr. F. C. Bullimore, the Medical Officer for the Workhouse, might, if he felt disposed to do so, put forward this fact as a reason for a considerable outlay in alcoholic stimulants.

THE BERLIN HYGIENIC EXHIBITION.

We regret to read that the Grand Hygienic Exhibition, which was to have been opened by the Crown Prince on the 15th inst., was completely destroyed by fire on May 12th. It is not certain how, or in what part of the building, the conflagration originated; but it broke out at about a quarter to seven, and before half-past nine the erection and all its costly contents lay a heap of smoking ruins. The action of the flames was favoured by a considerable breeze and the combustible nature of the building. A number of wagons which had arrived from Vienna, with ambulance appliances of all sorts for the Exhibition, were all consumed with their valuable contents at the railway siding near the Exhibition. America, and most of the European States, had contributed to the Exhibition. It appears, however, that comparatively little has come from England. The estimated loss is between two and three millions of marks, and though most of this is covered by insurance, it is said that the responsibility of the companies was not to arise until the opening day. The papers of the Exhibition—which was wholly the result of private enterprise—have alone been saved. Apart from the great pecuniary loss, the disaster is deplored as a serious check to the advancement of sanitary science, which could not fail to have profited by a comparative study of the splendid collection of hygienic apparatus and inventions of all kinds which has been consumed.

WATER SUPPLY.

The Kendal Union Rural Sanitary Authority, which has charge of a large portion of the Southern part of the County of Westmoreland, is acting with considerable energy in the matter of providing villages in its area with wholesome water, and has already completed two schemes, viz., at Beathwaite Green and at Arnside, while a third is in hand and will be finished in about a month. In the first case, a good supply of water has been impounded, and a group of one hundred houses supplied with self-closing wells (Kennedy's patent); and at Arnside a good supply has been provided by purchase from the Grange Local Board. The works in connection with this scheme have been of a very difficult character. Over three miles of pipe have been laid, the course of the mains being partly on the Furness Railway Co.'s line, partly on a tide-washed marsh, and for a distance of 500 yards underneath a viaduct which crosses an arm of Morecambe Bay, and which carries the Furness Railway over it. Engineering difficulties of no light character were met with; but these have been successfully overcome by Mr. Godfrey, the Surveyor to the Authority. The plans, etc., of the work were prepared by Mr. Godfrey, and at the formal opening of the works in Easter week his successful work was warmly acknowledged by the Chairman of the Authority, as also by J. Cropper, Esq., M.P., the late Chairman.

INJURIOUS HOUSES.

The conditions under which an action for damage caused by badly-constructed house-drains can be successfully prosecuted do not appear to be generally known. In the case of Neville *v.* Smith, an action was brought to recover £50 damages for loss and injury to health, caused by the alleged defective drainage of a dwelling house. The plaintiff stated that when he took the house the agent distinctly represented that it was well drained and in a proper sanitary condition; but after inhabiting it for a short time his family suffered from illness arising from defective drainage. On the other hand, it was contended that the owner had not guaranteed the

ciency of the drainage, and that the agent had no authority to give any such guarantee. The Judge held that as the agent who let the house had made the representation mentioned, the owner was liable, and judgment was given for the plaintiff, subject to the report of a scientific referee on the drainage. This is an important decision, as there was nothing in writing to prove the plaintiff's case, and, therefore, all that is necessary for persons about to take a house is to obtain an assurance before a third party that the house is thoroughly well drained. The great injury to health arising from imperfect drainage is even now not thoroughly recognised by the public, although such cases as those of the Duchess of Connaught frequently occur. Many cases of impaired digestion, low nervous power, malaise, headaches, morning sickness, as well as serious disease, arise from this cause, and all persons, therefore, who take houses should obtain a satisfactory assurance on this most important point.

HOUSEHOLD SANITATION.

An interesting lecture on this subject appears in the *Proceedings of the Medical Society of the County of Kings*, United States, in which the author, F. C. Wingate, Esq., recommends that before a person enters a new house, nothing should be taken for granted, but everything connected with the water-supply and drainage arrangements should be carefully examined. He illustrates this advice by mentioning the most frequent causes of illness in houses, from bad plumbing, injurious wall-papers, midden cesspools, bad trapping of drains, and especially from badly laid and constructed house-drains, which he rightly states are frequently elongated cesspools. It is often asked, if sewer-gas is so injurious to health, how is it that sewer-men comparatively rarely suffer from typhoid and other fevers? The answer is plain, viz., that it is not fresh sewage flowing into the sewers which produces injury to health, but the gases evolved from fæcal and other organic matters in the house-drains, which remain there for an indefinite period if sufficient water be not used to carry them into the sewers, or if the house-drains be not prôperly laid, and with a fair fall. The most frequent structural causes of stoppage in house-drains are, sinking of the pipes, from being laid on made ground, *i.e.*, ground from which the gravel or sand have been taken; and contraction of the channels of the pipes by cement being bulged into them. Drains are, however, more frequently injurious from other causes, viz., from bad joints, allowing soakage, which is often increased by flannels or other things partly stopping up the drains. These, and leaky cesspools, are included under the heading of defects causing pollution of *soil*; damp cellars, accumulations of garbage, etc., are amongst those which cause pollution of *air*; and defects in cisterns, such as connections with the drains by overflow-pipes, should be looked for as regards pollution of *water*. Erosion of lead-pipes is also pointed out as a frequent source of danger. A long list of things to be inquired into when taking a house is also given in the lecture. There is also another lecture in the same number, by Dr. D. E. Chace, on 'Healthy Houses', in which he sums up the whole matter as being contained in one sentence, 'pure air, sunlight, and plenty of it, and lastly, cleanliness, embrace the whole thought'. He points out especially the necessity of attention to this aphorism as regards bed-rooms, and the folly of trusting to traps to keep sewer or drain gases out of the house.

COTTAGE HOSPITALS FOR CHILDREN.

An extension of the principle of cottage hospitals is being attempted in America, where Dr. L. W. Baker, of Baldwinsville, Mass., is endeavouring to secure the erection, near his residence, of a cottage hospital for children. The design is to provide hospital accommodation in the country, under the best possible hygienic conditions, and fitted with all necessary appliances, in which children, from cities or elsewhere, suffering from chronic diseases, may receive medical care and careful nursing, together with all the advantages of fresh air, sunlight, and good food, afforded by country life, thus greatly increasing their chances for speedy recovery. The project is a good one, and has received support from a number of Transatlantic philanthropists and medical men.

THE NOTIFICATION OF INFECTIOUS DISEASES AT ROCHDALE.

Following the example set by Manchester last year, Rochdale is proposing to amend and strengthen the general public health law within its limits, by taking, through the agency of a Provincial Order, instead of by a separate Local Act, power to require the compulsory notification of infectious disease, to shut up schools and other places of public resort, to prevent members of a family, in which infectious disease is present, from going to their work, except with the sanction of the Health Officer, and to make other provisions of the type that is now familiar. In accordance with their invariable practice, the Local Government Board sent an inspector down to Rochdale to hear any objections to the proposed order, and a public inquiry into the matter was therefore recently opened there by Mr. C. N. Dalton. The medical men of the town engaged counsel to represent them in protesting against the proposed action of the Town Council. That the particular clauses that Rochdale has chosen to copy are open to abundant criticism in details, is admitted; but the general principle that they enunciate, scarcely deserves to be discredited in the fashion that a certain section of the community chooses to adopt. The labours of the Parliamentary Committee that is now sitting upon this very question will, it is hoped, result in some definite line of policy being adopted for the whole country, which will put an end to the diverse, and not seldom unworkable plans, that are in force in individual towns, for doing what ought to be of general application throughout the kingdom.

THE NOTIFICATION OF INFECTIOUS DISEASES IN NEW ZEALAND.

It is gratifying to find the notification of infectious disease meeting with so much attention, not only at home, but in our colonies and abroad. Indeed, the very sprightly and intelligent colony of New Zealand, is much in advance of the mother country in this respect, for by an Act which became law in September of last year, the physician in charge of a case of infectious disease is bound under a penalty of ten pounds, to give notice of such case to the Local Board for the district. The fee to be paid for each notification is half-a-crown, with the limitation that not more than three fees are to be payable for cases

of the same disease reported from the same house during the course of one month. By the same Act, power is given to the Governor-General to make regulations for the registration, with the Local Board, of all cowkeepers, dairymen, or milk-purveyors, for the appointment of inspectors of milk and of dairies; for the inspection of cattle in dairies; and for regulating the ventilation, cleansing, water-supply, etc., of dairies and cowsheds; for securing the cleanliness of milk stores, milk-shops, and milk-vessels; for prescribing precautions to be taken for protecting milk against infection and contamination, and for prohibiting the sale of milk in cases where the public is likely to be endangered by such sale. Since the passing of the Act, the Governor has granted powers to all Local Boards of Health to make regulations of this kind; so that, in the words of Dr. Courtney Nedwill, the Health Officer for the Christchurch District, who has kindly drawn our attention to the matter, 'dairies are now in New Zealand directly controlled under the provisions of the Public Health Act, instead of, in the round-about method in England, under the Contagious Diseases (Animals) Act of 1878.

THE REVENUE FROM ALCOHOL.

Mr. Stephen Bourne, in a paper 'On the National Expenditure upon Alcohol', which he read at the Statistical Society on April 18th, pointed out that, of the revenue raised by taxes on alcohol, probably one-half is expended in meeting the charges for law and justice, pauperism, lunacy, etc., entailed by the intemperance of consumers, and the private losses from same cause must impoverish the taxpayers: so that the public chest would be better filled if there were no alcohol on which to levy a duty. The waste of the nation's strength resulting from the undue consumption should be estimated not in money but in numbers, of which the annual sacrifice is by deaths 120,000, sickness 335,000, pauperism 200,000; crime, with other items, show 229,000; in all some 840,000, which, with the previously stated 1,100,000 employed in producing, makes very little short of two millions of our adult population employing or wasting their lives in this one direction. Mr. Bourne estimates that one-tenth of the vital power which maintains our population and accumulates our wealth, is engaged in manufacturing that which in its use employs and destroys that same vitality in one-twentieth of the people who are of sufficient age to become consumers, so that ten per cent. of our adults are rendered economically helpless and useless by reason of our national taste for drink.

VACCINATION AT THE CANNON'S MOUTH.

M. Frederic Krupp, the great gun manufacturer of Essen, believes in vaccination and re-vaccination; and as small-pox is prevalent in the village, he issued an intimation to his *employés* that he would like them all to undergo the operation. Six of the six thousand submitted to the lancet, whereupon M. Krupp issued an ukaz to the effect that every workman must either be vaccinated or leave his establishment. He promised them, however, that the operation should take place during working hours, that it should cost them nothing, and last, though not least, that only animal lymph should be used. They surrendered at once, rather than lose the benefits they obtain by working in M. Krupp's enormous establishment.

THE PUBLIC HEALTH

DURING APRIL 1882.

THE mean temperature of the air at the Royal Observatory, Greenwich, was 47°.9, and was 1°.9 above the average April temperature during 100 years. The mean was all but continuously above the average during the first eight days of the month; the temperature was variable from the 9th to the 18th, after which higher temperatures prevailed until the 24th. From the 25th to the end of the month the mean temperature was below the average. The coldest day during the month was the 16th, when the mean was 43°.0, and 4°.6 below the average; the warmest day was the 20th, when the mean was 23°.7, and 5°.6 above the average. Rain was measured at Greenwich on thirteen of the thirty days of the month to the aggregate amount of 2.4 inches, which was 0.7 of an inch above the average April rainfall in sixty-one years. The rainfall of the first four months of this year was 6.0 inches, and 0.7 of an inch below the average. The sun was above the horizon during 414.9 hours in April, and 151.4 hours of bright sunshine were recorded at Greenwich. The recorded sunshine during last month exceeded that in any of the five preceding corresponding months, in which the average amount was 111.1 hours. North-easterly winds prevailed during the first ten days of the month, after which the wind blew principally from the south-west.

In the twenty-eight large English towns, now dealt with in the Registrar-General's weekly returns, which have an estimated population of nearly eight and a half millions of persons, 23,001 births and 14,741 deaths were registered during the four weeks ending 29th inst. The births were equal to an annual rate of 35.5 per 1,000, against 37.0 and 36.4 in February and March. The birth-rate during April 1881 in the twenty towns then dealt with in the weekly returns was equal to 35.3, and almost corresponded with that recorded last month. The lowest birth-rates in the twenty-eight towns last month were 30.6 and 30.7 in Brighton and Plymouth. The rates in the other towns ranged upwards to 41.0 in Sunderland and 42.0 in Salford. The birth-rate was equal to 34.1 in London, whereas it averaged 36.7 in the twenty-seven provincial towns.

The annual death-rate in the twenty-eight towns during the four weeks of April averaged 22.7 per 1,000, and showed a further decline from the rates in the two preceding weeks, which were 26.6 and 23.7 respectively. The average death-rate in the twenty towns formerly dealt with was equal to 21.9 and 22.1 respectively in April 1880 and 1881. The lowest rate of mortality in the twenty-eight towns during last month was 17.6 in Cardiff. The rates in the other towns, ranged in order from the lowest, were as follow:—Halifax, 18.7; Derby, 19.0; Hull, 19.2; Sheffield, 19.3; Newcastle-upon-Tyne, 19.4; Leicester, 19.8; Birkenhead, 21.4; London, 21.5; Bristol, 21.7; Huddersfield, 22.2; Bradford, 22.5; Birmingham, 22.6; Leeds, 22.7; Plymouth, 23.5; Sunderland, 23.7; Norwich, 23.8; Nottingham, 24.0; Preston, 25.0; Salford, 25.5; Oldham, 25.6; Liverpool, 26.1; Bolton, 26.6; Brighton, 27.1; Wolverhampton, 27.7; Blackburn, 27.8; Portsmouth, 28.2; and the highest rate during the month was 30.9 in Manchester. The death-rate did not exceed 21.5 per 1,000 in London, whereas it averaged 23.8 in the twenty-seven provincial towns, which have an aggregate population somewhat exceeding that of London. It is worthy of comment that each of the seven Lancashire towns that are included in the Registrar-General's present list had, during April, a death-rate equal to, or exceeding, 25 per 1,000.

The 14,741 deaths from all causes in the twenty-eight towns, during the four weeks of April, included 848, which were referred to whooping-cough, 666 to measles, 296 to scarlet fever, 204 to 'fever' (principally enteric), 184 to diarrhœa, 124 to diphtheria, and 69 to small-pox. In all, 2,391, or 16 per cent. of the total deaths, resulted from these principal zymotic diseases. These zymotic deaths were equal to an annual rate of 3.7 per 1,000 in the twenty-eight

towns, and showed but a slight further decline from the rates that prevailed from the same diseases in the two preceding months. The zymotic death-rate last month was equal to 3.8 in London, and averaged 3.6 in the twenty-seven provincial towns. It ranged in these provincial towns from 0.3 and 1.3 in Halifax and Huddersfield, to 6.3 in Wolverhampton, 7.0 in Brighton, 8.3 in Portsmouth, and 8.4 in Bolton. Measles was fatally epidemic in each of the four last-mentioned towns, and whooping-cough was also exceptionally fatal in Brighton.

Whooping-cough was again during April, as it had been in each of the four preceding months, by far the most fatal zymotic disease in these large English towns. The annual death-rate from this disease, however, which had been equal to 1.78 and 1.44 per 1,000 in February and March, further declined to 1.31 during April; in the corresponding month of 1881 the death-rate from whooping cough in the twenty large towns then dealt with did not, however, exceed 0.57. The highest death-rate from whooping-cough during last month in the twenty-eight towns under notice was 2.6 in Brighton, 2.0 in London, and 1.7 in Newcastle-upon-Tyne. The death-rate from measles in the twenty-eight towns averaged 1.03 per 1,000, and showed a further increase upon the rates that prevailed in the three preceding months; it was nearly twice as high as the rate from the same disease in April 1881, when it did not exceed 0.54. The highest death-rates from measles in these towns during last month were 5.5 in Bolton, 4.9 in Portsmouth, 3.4 in Bradford, and 3.2 in Wolverhampton, Manchester, and Blackburn. The rate of mortality from scarlet fever averaged 0.46 in the twenty-eight towns, and corresponded with the rate that prevailed in March; it was also somewhat in excess of the rate from the same disease in April 1881, when it did not exceed 0.40. The highest death-rates from scarlet fever during last month in these towns were 3.0 in Nottingham, 1.8 in Hull, and 1.6 in Sunderland; 22 more fatal cases of this disease were recorded in Hull during April, raising the number that has occurred within the borough since the 1st July last to 804. 'Fever,' principally enteric, caused 204 deaths in the twenty-eight towns during last month, of which only 70 occurred in London, and 134 in the twenty-seven provincial towns, the aggregate population of which only slightly exceeds that of registration London. The mean death-rate from fever averaged 0.31 per 1,000 in the twenty-eight towns, and was somewhat lower than the rates recorded in the first three months of the year; in April 1881, however, the 'fever' rate in the twenty towns did not exceed 0.24. The largest proportional fatality of fever during last month was recorded in Liverpool and Portsmouth. The death-rate from diphtheria in the twenty-eight towns was equal to 0.19 per 1,000, and corresponded with that which prevailed in the previous month, but considerably exceeded the rate during April 1881, when it was but 0.11. The 124 deaths from diphtheria in these towns included 82 in London, 13 in Portsmouth, 5 in Birmingham, and 4 in Liverpool. The epidemic of diphtheria in Portsmouth, which prevailed more or less throughout last year, has not yet disappeared; the death-rate from this disease, which was equal to 1.7 per 1,000 in the borough during last year, averaged 1.3 during last month. During the four weeks of April, 69 deaths from small-pox were registered in the twenty-eight towns, equal to a rate of 0.11, which corresponded with the rate prevailing in March. Of these 69 deaths, 46 occurred in London, 6 in Bolton, 6 in Leeds, and 5 in Nottingham. Judged by the returns of the Metropolitan Asylums Hospitals, the prevalence of small-pox in London continues to decline, although the fatal cases in the provincial towns showed an increase. The number of small-pox patients under treatment in these hospitals, which had been 490, 436, and 367 on the last Saturdays in January, February, and March, had further fallen to 421 at the end of April. The average weekly number of new cases admitted to these hospitals, which had been 84, 79, and 58 in the first three months of this year, further fell to 48 during the four weeks of April. The proportional fatality of small-pox in the Metropolis was again largest in the south group of registration districts during April.

The rate of infant mortality, measured by the proportion of deaths under one year to births registered, averaged 153 per 1,000 in the twenty-eight towns during April, against 165 and 155 in the two preceding months. This proportion of infant mortality did not exceed 146 in London, while it averaged 159 in the twenty-seven provincial towns, and ranged from 92 and 101 in Cardiff and Hull, to 210 in Bolton, 212 in Norwich, and 215 in Blackburn. The high rate of infant mortality in Bolton and Blackburn was due to the continued fatal prevalence of measles.

The death-rate from diseases of the respiratory organs, judged by the Metropolitan returns, showed a further marked decline during April from the rates in the preceding months. The average weekly number of deaths referred to these diseases in London, which had been 739 and 435 in February and March, further fell to 342 in April. This number was 83 below the corrected weekly average in the corresponding months of the last ten years. The annual death-rate from these diseases in the Metropolis, which had been 9.9 and 5.8 in the two preceding months, further fell to 4.6 in April. The annual death-rate from these diseases during last month was equal to 6.3 in Liverpool, and 5.0 in Salford.

The causes of 361 deaths in the twenty-eight towns during the four weeks of April were not certified, either by a registered medical practitioner, or by a coroner. These uncertified deaths were equal to 2.4 per cent. of the total deaths registered, and corresponded with the proportion prevailing in the preceding month. The percentage of uncertified deaths did not exceed 1.2 in London, whereas it averaged 3.4 in the twenty-seven provincial towns. The smallest proportions of uncertified causes of death were 0.3 and 0.6 in Birmingham and Nottingham, whereas the proportion ranged upwards in the other towns to 5.3 in Salford and Sheffield, and 6.5 both in Liverpool and Halifax.

Among the population, consisting of little less than a million persons, estimated to be living in the outer ring of suburban districts around London, the annual death-rate from all causes, during April, was equal to 17.8 per 1,000, and was 1.4 below the rate that prevailed in the previous month. The annual death-rate from the principal zymotic diseases in these suburban districts was equal to 3.2 per 1,000, showing a still further increase upon the rates in the three preceding months of the year, which had been 2.0, 2.6, and 2.8 per 1,000. During the four weeks of April, 10 fatal cases of small-pox were recorded in the outer ring, of which 4 occurred in West Ham. Whooping-cough and measles also showed considerable fatality in the outer ring.

Mrs. Turner, widow of Mr. Charles Turner, at one time M.P. for South-West Lancashire, has intimated her intention of building a home for incurables in the suburbs of Liverpool. The home will accommodate 200 patients, will cost £40,000, and will be suitably endowed by Mrs. Turner. A site overlooking the Mersey has been already secured.

Mr. Wm. Dawson has been presented with the following testimonial on vellum, handsomely illuminated, and signed by every member of the Board:—'The St. George Local Board of Health and Urban Sanitary Authority, Gloucestershire.—The chairman and members of the St. George Local Board of Health and Urban Sanitary Authority have much pleasure in presenting this testimonial to Mr. William Dawson, who has been their officer for the last nine years. Mr. Dawson has during that period upon all occasions faithfully and ably discharged his duties as surveyor, which appointment he voluntarily resigns; and in leaving he takes with him the best wishes of the board for his future happiness and prosperity.—April 19, 1882.'

Messrs. Robert Boyle and Sons' offices and show-rooms, 64, Holborn Viaduct, have been fitted throughout with Edison's incandescent lamps, and the experiment is pronounced to be entirely successful. It may be interesting to mention, in connection with this application of the electric light, that the late Mr. Robert Boyle was one of the first inventors of the fixed electric light.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this society was held on Friday, April 21st, Dr. J. W. Tripe, President, in the chair.

Bill for the Notification of Infectious Diseases.—Letters were read by Dr. Vinen from Sir Trevor Lawrence, M.P., and Dr. Farquharson, M.P., in reply to a letter from the society forwarding to them a copy of the resolutions passed by the society on the subject of compulsory notification of infectious diseases. Sir Trevor Lawrence hoped that medical men would modify their views as to the person upon whom should rest the duty of notifying these cases, and expressed the opinion that the only way to have a really effective system of notification was to adhere to the proposal of the Bill, viz., that this duty should rest upon the medical attendant. Dr. Farquharson, in his letter, stated that he believed the Bill would be referred to a select committee for the purpose of more fully discussing this point.

The council presented a report upon this subject. They recommended—first, that the Act should apply to the Metropolis; secondly, that erysipelas should be excluded from the list of diseases to be notified; and thirdly, that section 3 of the Bill should be in accord with the resolution of the society of Nov. 17th, 1876, which was reaffirmed on March 8th, 1881, viz.: that in the opinion of the society, whenever a case of infectious disease occurs in any house or vessel, it should be a legal obligation on the person in charge of the house or vessel, or on the person in charge of the case, to report the fact to the sanitary authority without delay; and that it should be a legal obligation on every medical practitioner in attendance on any such case to give immediate written information respecting its nature to the occupier or other person responsible for reporting it to the sanitary authority. The council also recommended that a copy of the report be sent to the members of Parliament backing the Bill.

A discussion upon the report then ensued, and it was resolved to adopt that portion of the report which related to the metropolis being brought under the operation of the Act. By a very narrow majority, it was decided to adopt the recommendation of the council concerning the diseases to be notified.

The Association for the Advancement of Medicine by Research.—The President announced that he, in his official capacity, had been elected a member of the council of this association.

Changes in By-laws.—Dr. ALFRED CARPENTER gave notice that at the next annual meeting he would move that by-law vii should be so modified as to give associates a right to vote.

The following gentlemen were elected extra metropolitan members of the society:—Dr. C. H. Furnivall, Medical Officer of Health for Acton, and Mr. Herring, Medical Officer of Health for Builth, S. Wales.

Sanitary Supervision of Dairies and Milkshops.—Mr. FOSBROKE, as President of the Midland Association of Medical Officers of Health, said he was requested to lay two resolutions passed by that society on April 6th last before this meeting. The first stood as follows: 'That the sanitary supervision of dairies and milkshops and the carrying out of any legislative enactments for the prevention of the spread of human infectious disease by milk should come under the jurisdiction of the sanitary officers of the locality in which the dairy or milkshop is situated.' This resolution was proposed in Birmingham by Dr. Thursfield, and was almost identical with one passed by the London society two years ago.

Mr. Fosbroke wished to explain how 'the order' had been interpreted and applied by the Gloucestershire Court of Quarter Sessions to parts of his district, because it showed that one county authority had decided that it was expedient for sanitary authorities to carry out the order. He concluded by proposing that the resolution of the Birmingham and Midland Association be affirmed. It was subsequently decided to refer the matter to the Council to decide what course should be taken.

Control by Sanitary Authorities of Elementary Schools.—Mr. FOSBROKE then brought before the society the second resolution which had been adopted by the Birmingham and Midland Association, viz.: 'That this meeting, feeling that some dangerous infectious diseases are disseminated through the agency of public elementary schools, approves of the action of the Educational Department in investing sanitary authorities with the power of requiring the closure of such institutions, with a view to preventing the spread of such diseases.' The much-needed power of closing such schools under certain circumstances was proposed to be given to sanitary authorities by section 98 of the Code of Minutes of the Educational Department, bearing date March 6th, 1882, now laid on the table of both Houses of Parliament, pursuant to the 97th section of the Elementary Education Act, 1870.

In reply to Dr. Buchanan, Mr. Fosbroke said that the question whether schools should or should not be closed ought to be most carefully considered, otherwise injustice might be done to school authorities, but that when it was found that a school was disseminating disease, the power of closing it should be in the hands of the sanitary authorities. He then proposed the Birmingham resolution: this was carried, and a copy of it was ordered to be sent to the Educational Department.

Dr. ALFRED CARPENTER thought this power should be in the hands of the sanitary authorities, but that it should be carefully exercised. The result of closing some schools was that the children played together in the streets and in their own homes under most insanitary conditions, while in the school they would have been where there was abundance of ventilation, and where the hygienic conditions were good. The sanitary condition of the school itself was a most important point in deciding whether the school should be closed or not.—Dr. C. E. SAUNDERS thought that as a general rule the closing of a school tended to limit the extension of an outbreak of infectious disease among the pupils.

After a few words from Dr. DUDFIELD, in which he suggested that it might be well to take this opportunity of calling attention to the necessity of the notification of cases of infectious disease, Dr. TRIPE stated, in reply to a question, that he had found no difficulty in procuring the closure of schools in his district.

A paper was then read by Dr. G. F. WILLOUGHBY, entitled,

SUGGESTIONS FOR THE REORGANIZATION OF THE SANITARY SERVICE.

The author began by pointing out the shortcomings of the Public Health Acts of 1872—75, which had failed to provide the country with a class of trained health officers or of men devoting their whole time and attention to sanitary questions; even the few rural combinations, from which much might have been expected, having been broken up whenever the medical officer of health chanced to give umbrage to influential offenders.

He insisted on the importance of medical officers of health being free from private practice, and the necessity of their being independent of the local authority, arguing that their duties were those of inspection of the public health, and they were not servants or agents of the local boards, as were surveyors, parish surgeons, &c. They ought to be appointed by the central government as much as H.M. inspectors of mines, shipping, &c., whom it would be deemed absurd to place at the mercy of the persons over whose acts they have to watch.

The medical officer of health ought to show proof of a knowledge of physics, chemistry, engineering, and sanitary science generally—subjects which form no part of the education or examination of the ordinary medical student; in other words, he should possess a certificate in sanitary science as well as diplomas in medicine and surgery, which are all that are required of him at present. Such certificates, he thought, ought to require an examination in

forensic medicine, and the law of evidence also; in fact, to cover the whole ground of state medicine.

Poor-law medical relief, he maintained to be a department of the public health, and as such it ought to be separated from pecuniary relief, and transferred from the guardians to the sanitary authority. The medical officer of health and the parish surgeons would thus be drawn closer together, and the former would gain access to much valuable information, *e.g.*, as to the prevalence of diseases other than infectious, which are no mean indications of the hygienic conditions of a district.

Dr. Willoughby could not agree with those who advocated the creation of a minister of health, who would, in this country at least, not be a medical man. The director of the public health must be a permanent officer, independent of changes of political parties—in fact, a permanent Under Secretary of State. He would prepare the division of the duties and functions of the Local Government Board between two co-ordinate departments—a poor-law board and a board of health, the latter taking cognizance of all matters in any way affecting the public health, including sanitary works, medical poor relief, and a few matters at present referred to other branches of the Government, the poor-law board retaining those relating to finance, poor relief, workhouses, and not of a sanitary character. Each should be under a vice-president, responsible only to the president for the time being of the Local Government Board.

The vice-president of the Board of Health should always be a physician chosen for his special knowledge and administrative ability, and the Board would consist of six other members—three medical men, two engineers, and one chemist. The present medical officer and senior inspector would constitute the first Board, future vacancies being filled by selection from inspectors and medical officers of health.

The whole country should be divided into urban and rural sanitary districts, the former comprising only towns of 80 or 100,000 inhabitants, the latter consisting of large rural areas, each with a considerable central town; and as far as possible, even by readjustment, division of other, especially registration, districts should be avoided.

He did not think that the medical officers of health of single parishes over the country would lose anything by being superseded; such as chose to qualify themselves for sanitary service would be promoted, and the position of those at present devoted to it would be improved; the rest had much better retire altogether.

The local boards, though no longer appointing the medical officers of health, ought to have some acquaintance with the nature of their work. He proposed that in each sanitary district, urban or rural, there should be a local board of health, composed partly of members elected by the ratepayers, and partly of others nominated by the Board of Health in Whitehall. The latter would, of course, be men known to be interested in sanitary work, or specially versed in some collateral science; the former should, by preference, be medical men, architects, engineers, and the like.

Registration of births and deaths originally bore only on the descent of property, but since the value of vital statistics has begun to be recognised the present system is seen to be very imperfect. A large proportion of the 'causes of death' are untrustworthy, being either 'uncertified' and furnished by the friends, or suggested by the registrar, while many of those certified by medical men are most unsatisfactory.

The correction (?) of the returns by a non-medical superintendent registrar is worse than useless, and though the medical officer of health is often able to revise the duplicates furnished to him for the use of the sanitary authority, his corrections do not reach the office of the registrar-general. The appointment of medical men as superintendent registrars has been proposed, and seems unobjectionable; but the same end would be attained, and perhaps better, if the superintendent registrar had his office in the same building as the medical officer of health, and all district registrar's returns were first submitted for examination to the latter. Information of death should be given sooner than is now required, and in all cases of uncertified or doubtful causes, the medical officer of health would institute an inquiry on the spot, giving a corrected certificate if perfectly satisfied, or reporting the case to the coroner if not. There would thus be more inquiries but fewer inquests, and many cases of foul play would probably be brought to light which are at present concealed by the practice of accepting uncertified causes. The horological value of the registrar-general's reports would be greatly enhanced.

The whole method of taking medical and scientific evidence in court is radically wrong. The equality in the eye of the law of all medical men is a mischievous fiction; but the fundamental mistake lies in the custom of retaining medical and scientific men as witnesses for the prosecution and defence, thus inevitably converting the expert into the advocate. The function of the expert should be to assist the court by stating, without reserve and regardless of either side, scientific facts which judge and jury could not otherwise know, in language scientifically accurate, and at the same time intelligible to unscientific persons, avoiding excess of confidence or of caution, and in accordance with the sometimes arbitrary laws of evidence. To do this with credit demands study and practice, and there is an urgent need for a class of trained and skilled medical experts. Though questions of insanity, of the remote consequences of railway accidents, and a few others, would still require the services of specialists, experts in forensic medicine generally and the allied scientific subjects would be ready to hand, in the persons of medical officers of health, such as have been described, versed in every branch of state medicine, and familiar with the methods of scientific investigations.

If the local authorities were deprived of the right of appointing medical officers of health—a power which they have so often shown themselves unfit to exercise—they could not be called on to provide their salaries, but the change would afford a ministry an opportunity of granting a much desired relief to the local burdens.

The case of the Metropolis, which does not come under the Local Government Act, need not present any real difficulty, since if the medical officers of health were state-paid, it could be divided into more equal districts, each under its medical officer of health, just as it now is apportioned among Her Majesty's inspectors of schools.

A brief discussion followed the reading of the paper, and the society adjourned.

THE BIRMINGHAM AND MIDLAND ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

A MEETING of the members of the above association was held in the Council House, Birmingham, on April 6. Mr. G. H. Fosbroke (president of the association and medical officer of health for the Stratford-on-Avon Combination of Sanitary Authorities) occupied the chair; and the other members present were Dr. Bond (Gloucestershire), Dr. A. Hill (Birmingham), Messrs. G. L. Hobbes (Clent), H. Page (Redditch), S. Manley (West Bromwich), W. W. Thursfield (Shropshire), E. Chesshire (Birmingham), and H. May (the hon. sec.).

The minutes of the last meeting having been read and confirmed, the PRESIDENT read a paper on the

PRESENT WORKING OF THE DAIRIES, COWSHEDS, AND MILKSHOPS ORDER OF 1879.

He said that, in the first place, he most emphatically expressed the opinion that the Act of Parliament for regulating the well ordering of the dairies, cowsheds, and milkshops of the country was an important and necessary piece of legislation, and went on to inquire how far in its administration it fulfilled the requirements for which it was intended. It would be an easy matter to quote instances of the diffusion of epidemics of infectious diseases; indeed, the fact that food very often acted as a channel by which disease was conveyed from household to household was

not only thoroughly established in the minds of all members of the medical profession, but was daily becoming more and more appreciated by the non-professional portion of the community. Milk, being a powerful absorbent, was a channel by which zymotic disease frequently travelled, and it could not for one moment be denied that the State was justified in making an attempt to protect the milk consumer against the danger of contracting disease when making use of such food. The general administration of the Act had been entrusted to the sanitary authority in urban districts, and quarter sessions in rural districts, two governing bodies whose functions had nothing in common. The order was intended to regulate the general sanitary state of dairies and cowsheds, and the health of the cattle, and in urban districts the sanitary officials were frequently made responsible for them, but in country districts, whence in reality most of the milk supplies were derived, the police and veterinary surgeons were generally selected as the inspectors. In dealing with diseases of animals, veterinary inspectors were unquestionably the proper executive, but why the police should be expected to be versed in sanitary science he was at a loss to understand. How could it be expected that a police officer, however zealous and intelligent, could, as a rule, have devoted sufficient study to the intricacies of sanitary science as to entitle him to express any reliable opinion upon such complicated questions as those connected with the provision of efficient drainage and wholesome water? Again, how could veterinary surgeons or the police be expected to be in a position to decide whether or not a dangerous infectious disease existed at this or that dairy, or of the precautionary measures requisite when such was the case? He thought, then, they would agree with him in asserting that the administration of the order should in all cases be entrusted to local sanitary authorities. Surely medical officers of health and sanitary inspectors were more competent than the police to decide when it was necessary for a veterinary surgeon to examine the cattle. Of course, it might be contended that sanitary officials were more or less responsible for the sanitary condition of all inhabited dwellings, and that in the large majority of cases they would be answerable for the whole soundness or otherwise of dairies. To a certain extent such a view of the position was correct, but at the same time sanitary officials did not possess the legal status requisite to prevent milk from frequently acting as a channel by which zymotic disease could travel. If sanitary authorities were appointed to carry out the order, but very little additional work would devolve on their officials, and clearly the expense incurred in its administration would be considerably less than it was now. It seemed to him that it would be injudicious to petition the Privy Council on this point at present, as the order had not yet been fairly tested, and especially as the remedy for the evil he had endeavoured to expose could be suitably supplied by Courts of Quarter Sessions. The mode of procedure which he advocated was that county authorities should appoint the respective rural sanitary authorities and their officers as inspectors under the Act. This course had been adopted by the Gloucestershire Court of Quarter Sessions, and as he had had the opportunity of witnessing the practical effect of such action as applied to certain parts of his district, he had no hesitation in suggesting that other Courts of Quarter Sessions should adopt a similar course. Before it was clearly explained to him how the order was to be applied, he was inclined to think that rural sanitary boards and their officers would be made responsible for duties which really devolved upon county authorities, and that unless the Act was amended, sanitary officials should not, however desirable it might be to entrust the working of the order to their care, be called upon to assume functions that did not legally belong to them; but after some correspondence with the chairman of the Gloucestershire Sessions, he quickly volunteered to assist that court in every way that he could. He then gave an abstract of the circular issued by the Gloucester Court of Quarter Sessions, containing a selection of instructions to the sanitary authorities which had promised co-operation, and pointed out that the court seemed to appreciate the importance of the regulations issued under the order being carried out by sanitary authorities. It could not be thought, he said, that he had supported the action of the Gloucester Court of Quarter Sessions from pecuniary motives, as the fees were most meagre; at the same time, he could not but feel that had the example set by the Gloucester authority been followed generally by Courts of Quarter Sessions, the order would not remain the dead letter it now was.

Dr. BOND expressed approbation of dairies and milkshops being inspected by medical officers of health; but differed from the president in his expressions of approval of the course pursued by the Gloucestershire Court of Quarter Sessions, and gave an account of how he was treated by that authority, whose action in the matter, he said, had neither been dignified nor proper.—Dr. THURSFIELD said the legislation on the subject was most anomalous, and in consequence in many parts of the country the law was a dead letter. What was wanted was simply to place the matter on the same footing in non-corporate districts that it now occupied in corporate towns. Some months ago he had brought this matter before the Society of Medical Officers of Health, and a resolution he had proposed on the subject had been carried and forwarded to the proper quarter. He would therefore move a similar resolution on the present occasion. He proposed 'That the sanitary supervision of dairies and milkshops, and the carrying out of any legislative enactments for the prevention of the spread of human infectious disease by milk, should come under the jurisdiction of the sanitary officers of the locality in which the dairy or the milkshop is situated.'—Mr. PAGE seconded the proposition, which, after a brief discussion, was adopted unanimously; and it was resolved that the hon. secretary should be directed to forward it to the Privy Council.

Mr. H. MAY (the hon. secretary) then read a paper on the SANITARY PROVISIONS OF THE NEW EDUCATION CODE, published at page 459.

Dr. BOND and Mr. PAGE took part in the discussion which ensued; and the PRESIDENT moved, 'That this meeting, feeling that some dangerous infectious diseases are disseminated through the agency of elementary schools, approves of the action of the Education Department in investing the sanitary authorities with the power of requiring the closure of such institutions, with a view to preventing the spread of such disease.' The motion was seconded and agreed to, and it was decided that the resolution should be forwarded to the Education Department.—The meeting then terminated.

NORTH-WESTERN ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE members of this Association held their annual meeting on April 13th at the offices of Mr. F. Scott, the Secretary, King Street, Manchester. Dr. Kenyon (Chester), the retiring president, occupied the Chair, and there were also present: Dr. Fox (Mid-Cheshire), Mr. Pettinger (Stretford), Mr. Hughes (Ashton-under-Lyne), Mr. Robert Dudley (Stalybridge), Mr. Paton (Levenshulme), Mr. Rhodes (Glossop), and Mr. Vacher (Birkenhead), Hon. Secretary.

Mr. Vacher read the report, which stated that the Association had recently completed the eighth year of its existence. The Committee were assured that it rendered good service to the profession of Medical Officers of Health and to the community, and they were encouraged to hope that as years advanced it might become yet more useful and active. Five gentlemen had been elected as associates, and three new members had been obtained during the year. At present the number of members was twenty-eight, and of associates twenty-six. The number of honorary members remained the same as at the formation of the Society. The report was adopted.

A letter was read from the Local Government Board with reference to a proposal of the Association that the Local Government Board should issue model tables for the classification of diseases, births, and deaths, by Medical

Officers of Health. The Local Government Board, in their letter, said that they had carefully considered the suggestions made, and, while they did not wish to discourage the preparation of more detailed or differently arranged tabular statements of disease and mortality, they considered that in the forms marked 'A' and 'B', the use of which was compulsory, provision was made for all the statistical information which could usefully be given on an uniform plan. After some conversation it was resolved to acknowledge the receipt of the letter, and to thank the Local Government Board for their consideration of the subject.

After the transaction of some formal business, Mr. Hughes was elected President for the ensuing year, and the other officers were appointed.

Mr. Hughes, having taken the Chair, read a paper upon 'THE OPERATIONS OF THE PUBLIC HEALTH ACT', published at p. 434, at the conclusion of which, on the motion of Mr. Pettinger, seconded by Mr. Paton, and supported by Dr. Fox, a vote of thanks was accorded to him.

BUILDING EXHIBITION AT BIRMINGHAM.

LAST month a Building Exhibition, similar to the one that is annually held at the Agricultural Hall, London, was opened at Bingley Hall, Birmingham, under the direction of Mr. Black, the successful promoter of that and other exhibitions at the Islington Hall.

As numbers of the same exhibitors were present at the Midland show, that were present in London, it would be but mere repetition to again describe their exhibits in detail, as our last number contained a full report of the principal London exhibits. There were, however, some firms in the Birmingham district who exhibited that were not in London, and to these our remarks will, in the main, be confined.

Occupying a prominent position, and a very attractive stand, Messrs. Archibald Kenrick and Sons of West Bromwich, contributed a most interesting collection of cast-iron enamelled sanitary and domestic wares, as well as an extensive assortment of builders' and domestic ironmongery, in iron, of which they are one of the largest makers in the Kingdom. The enamelled sanitary ware comprised almost every article coming under that denomination, and, it must be understood, are coated with real porcelain-enamel, and not mere Japan, oftentimes misnamed enamel, and by which the public are often deceived and disappointed. Messrs. Kenrick's enamel is noted for its clearness and whiteness, and they manufacture some of the largest articles in this department. The cast-iron enamelled articles are mainly indestructible, as applied to sanitary purposes, where they are used as a fixed utensil, and beyond combining all the advantages of porcelain or earthenware, as to cleanliness, present a solidity and freedom from danger of breakage to which the clay substitute is a stranger. Sanitary bodies, and those who have the control of the fittings for prisons, hospitals, etc., would save a considerable sum were they to adopt Messrs. Kenrick's sanitary appliances more extensively. But, while devoting their energies in this direction, the firm are by no means unmindful of the fact that an artistic design in cast metal costs but little, if any more, than the most common-place pattern, and, pursuing this idea, they have introduced such effects in cast-iron domestic fittings, comprising door furniture, such as bell-pulls, letter-box plates, knobs, handles, and even the common class of latches, that a few years since were never thought of or attempted. It is said that, 'a thing of beauty is a joy for ever', and it may certainly be well applied to these simple, but necessary, attributes. A common cottage or stable latch, if modelled in an artistic design, such as Messrs. Kendrick introduced to the visitors at Bingley Hall, well finished and coated with Berlin black, which allows every line in the pattern to be clearly distinguished, must certainly be more appreciated by its users, than its ugly prototype of olden times; and when we reach the higher class articles in this range, intended for hall or front doors, we find that they can be obtained in really art designs, and cast as finely as brass at a mere nominal price as compared with the more expensive metal. Bronzed in *verd antique*, Florentine, nickel plated, etc., they were interesting to look upon, and must, we think, largely supplant brass-fittings of the same class.

Messrs. Hodkinson and Clark, of Small Heath, Birmingham, who are 'at home' in the midland metropolis, had the same pretty erection that has become one of the specialities of the London building exhibitions, and their Queen Anne blind, Early English blind, and metallic Venetian are as much appreciated in the home of their birth as here in the great city. The theatrical curtain, of which we gave a description in our report of the London Exhibition, attracted much notice, and a selection of cornices, of various woods, treated as regards finish in the most tasteful manner both as regards gold and colours, were not the least interesting feature of their attractive exhibit.

Messrs. Ford and Margrett, Camp Hill, Birmingham, sent an excellent assortment of enamelled slate mantelpieces, on which the most costly marbles were well depicted by the artist's pencil. That known as St. Anne's and Morris's green were amongst the most prominent as good imitations, and all were supplemented by modern grates, and the usual appendages of the fire-place. The firm aim principally to produce medium and best class work in enamelled slate at a moderate price, and they appear to have succeeded well in their task.

Messrs. Doulton and Co., Lambeth, had a similar exhibit to that shown at the London Building Exhibition, and the same may be said of Messrs. Joseph Cliff and Sons, Wortley, near Leeds. Parquet flooring, stair-treads in parquet, newals, balusters, etc., of excellent design and workmanship, were shown by Mr. Eberhard, Edward Street, Hampstead Road, London; and Messrs. Esdaile and Co., Wenlock Basin, City Road, exhibited an assortment of Canadian, Swedish, and American ready-made joinery.

Art metal work was well represented by the firms of Hart, Son, Peard and Co., and Messrs. Jones and Willis, both in brass and wrought iron, and comprised examples of the various features in ecclesiastical and general work for which these firms hold so high a position.

Messrs. H. C. Webb and Co., of Worcester, were prominent with their Patent Diachromatised Blocks, to which we have already adverted.

Mr. Maignen was present with his Filtre Rapide, and Mr. John Parker, of Woodstock, Oxon., showed his Patent Dry Earth Closets.

Mr. C. Perceval, 19, Devereux Court, Temple, London, the agent for 'Westmacott's' Patent Poor Man's Stove, exhibited drawings of that invention, as well as a working model of Sawyer's Patent Furnaces with sliding bars, which has also been described in the SANITARY RECORD.

The Birmingham Sanitary Association, 47, Colmore Row and Bradford Street, Birmingham, brought together a very well assorted collection of sanitary appliances, conspicuous amongst them being a number of Boyle's well known Air-Pump Ventilators, in every size, suitable for the ventilating of soil-pipes and all classes of buildings, the special features of which have been mentioned upon other occasions in the SANITARY RECORD. Another noteworthy appliance exhibited by this firm was Pott's Patent Edinburgh Air-Chambered Sewer Trap. This trap, in addition to awards received from the British Medical Association and the Sanitary Institute of Great Britain, has been recommended by the highest sanitary authorities. The object aimed at in its construction is to collect in one chamber the discharge from the soil-pipe and pipes from sinks and baths before entering the sewer, and by means of a ventilating pipe to carry off any sewer gases that may be escaping, and so prevent their rising into the house. So ingeniously, yet simply, is this apparatus constructed, that a thorough disconnection is effected between the house-drains and the sewer, which, it will be conceded, is a most important result. Specimens of bolts and other registered yard traps were shown, also Adam's Patent Syphon Water-Waste Preventer, and Adam's Patent House Flush-Tank, as well as a variety of patent Wash-

out and valve-closets, earth-closets, baths, lavatories, Dr. Bond's Euthermic Heating Apparatus, Schonheyder's Sanitary Stove, and in fact almost every modern invention for the purification of the air of our dwellings; the display of the Birmingham Sanitary Association being superior to that of any other local firm.

Bean's Patent Valveless Water-Waste Preventers, which attracted so much attention at the Agricultural Hall, were shown at stand No. 123 by the manufacturer, Mr. O. D. Ward, of 182, Upper Thames Street. The salient points of these appliances were pointed out and illustrated in the SANITARY RECORD of last month, in the report of the London Building Exhibition, and we would suggest to those who may not have seen them to make themselves acquainted with their action and principle, as they are exceedingly simple, and, as the name implies, quite valveless. This stand was also well stored with many other sanitary goods, including lavatory basins, stoneware inverts for manholes, iron manhole doors, etc., and special hopper and other closets, particularly suitable for use with the Patent Water-Waste Preventer before referred to.

The Mangotsfield Pennant Stone Company, Staple Hill, Bristol, are another firm who followed the Exhibition from London, and showed, at Stand No. 75, specimens of this excellent stone for paving, kerbing, and every kind of street work, as shown at the Agricultural Hall, the admirable qualities of which we pointed out in our report of the Exhibition in that building.

Amongst the firms exhibiting bricks, tiles, etc., the display made by the Madeley Wood Co., Madeley Wood, Stourbridge, was one of the most effective and varied. A small-span roof was fitted up at their stand, divided into a number of sections, each composed of a different patttern or make of tile, and finished complete, with suitable finials and ridges. The specimens of flooring-squares, in red, blue, and buff and white facing-bricks shown by this firm were very good, both as regards design and finish.

The Hygeian Rock Building Composition, that attracted so much attention at the Agricultural Hall, was also shown here by Mr. William White of Abergavenny, the patentee. This preparation is equal, if not superior, to anything extant as a damp-proof course (see page 458), while it possesses the peculiar and important feature of greatly increasing the strength of any brickwork built up with it, so as to save something like 25 per cent. in the cost of building, as a wall built with this material will take double the weight and strain of an ordinary wall. Specimens of water-tanks, built of brickwork with this composition, illustrated in a very decisive manner how admirably it is adapted for such purposes, or for any structure where moisture is to be kept out. Its extraordinary strength was clearly demonstrated as follows: a piece of 9 in. wall, of three or four courses of brickwork, and 6 ft. long, was shown, with the composition run in between the two thicknesses, binding the mass so firmly together that a weight of eight or ten cwt. may easily be suspended from the centre (each end of the beam resting on supports, leaving a clear bearing of 4 ft. 8 in.), upwards of 16 cwt. being required to be placed upon it before any signs of yielding would take place.

The Birmingham Paint and Colour Co., Sparbrook, Birmingham, made a choice selection of their various productions, comprising colours, paints, varnishes, etc., suitable for all trades, as well as all kinds of printers' inks. Of the former, the 'Greens' are especially good, and, being perfectly non-arsenical, are particularly suitable for all indoor work; in fact all the colours made by this firm have long been held in high repute for their innocuous nature. The varnishes are also worthy of note, especially their 'Church Oak', which is warranted to dry without 'bloom' or 'tack', and the case containing the specimens, which is coated with it, fully bears out this important quality.

At Stand No. 28, Messrs. Hayward Bros. and Eckstein made their usual attractive display of the Semi-Prismatic Pavement Lights, which are now being looked upon as a *sine quâ non* in all large towns, and are comparatively in use as much in Birmingham as in the Metropolis, where their application for directing the daylight into basements and underground situations of our great and crowded thoroughfares is universal.

Mr. J. E. Ellison, Victoria Square, Leeds, had a very interesting collection of his well-known ventilators, including the 'Conical' Ventilator, for admitting fresh air without draught, and his newest invention, the 'Radiator' Ventilator, the special features of which have been pointed out in previous numbers of the SANITARY RECORD, its salient characteristic being that it will prevent draught in the stormiest weather. Some very good ventilators, without movable parts, known as 'Stevens' Patent Exhaust Ventilators', are also shown, and are particularly suitable for drawing off the vitiated air from public buildings, hospitals, etc.

An important invention, consisting of a Self-Acting Deodorising Closet, manufactured by Messrs. Brazier and Son, of 106, Blackfriars Road, S.E., was shown, which possesses many important features, as does also a Drain Deodoriser made by the same firm, but pressure of space prevents us going into details at the moment, and we hope to give further particulars in our next number.

The Patent Lock-jaw Tiles recently introduced by Mr. Phillips, Newport, Mon., were also exhibited. The speciality of these 'roof coverings' consists in the simple mode adopted for fixing them, while they are absolutely proof against snow, wind, and rain.

THE MANCHESTER SMOKE ABATEMENT EXHIBITION.

THIS Exhibition was closed on Saturday, the 6th instant, and as far as the numbers who visited it are concerned, in connexion with the time it was open, may fairly claim to have been as successful as its predecessor at South Kensington. In a pecuniary sense, also, the results will, we believe, prove more satisfactory than did those of the parent Exhibition, and the local committee will not be left with the incubus of a heavy deficit, as was the case at the London Exhibition. In the prospectus issued from South Kensington, it was intimated that Exhibitors would be called upon to pay the expenses incurred in testing their various appliances, and had this decision been adhered to, the balance sheet at the close would have appeared very different; but with a liberality that exhibitors could not fail to appreciate, these tests, which were among the most costly items with which the committee had to deal, were effected for them gratuitously. At Manchester it was intimated that the arrangements would be the same as at South Kensington, though whether the authorities were at the time cognisant of the departure we have named from the original programme we are unaware, but certain it is that those exhibitors who wished to have tests of their appliances taken were under the impression that they would be done free. At the eleventh hour, however, so to speak, exhibitors were informed that the expenses incurred in conducting these tests would have to be defrayed by themselves. This necessarily caused some dissatisfaction, and although a strong point was made of the liberality of the London Committee, that of Manchester was inexorable on the question at issue, and the consequence has been that the number of those exhibitors who applied to be tested were very small; and we are left in ignorance, for a time at least, as to the merits or otherwise of several of the appliances that were shown. We regret this little misunderstanding very much, and it is one that in all future Exhibitions connected with the movement will, it is hoped, be avoided. When we come to the consideration of the question as to the effect the abatement of smoke has had upon the Manchester people, we are inclined to think they are not so much impressed with it as the Londoners and the southern and western portions of the kingdom. As regards furnaces and all manufacturing appliances the interest is as keen on the part of users of steam power as could be wished, for these gentlemen well know that the consumption of smoke means an economy of fuel, and beyond the fact of the Act of Parliament compelling them to consume their smoke or not to create it

the severe competition that exists in all branches of manufacturing industries behoves them to adopt the best appliances in this direction. But when we turn to domestic grates the case is different. In the northern counties, where coal is cheap and plentiful, and the thermometer falls to a low standard, large grates, and consequently large open fires, are in the ascendant, and persons who have been used to a liberal supply of coal are, perhaps, little likely to give up their deeply rooted views or prejudices from the results of a single exhibition. No doubt, however, the intelligent population of the northern counties will eventually grasp the fact that warmth and comfort can be obtained and money saved, with the addition of a corresponding improvement to health, by the adoption of a more rational system of warming their houses.

Mr. W. Barton, Boston, Lincolnshire, exhibited his patent 'Premier' stoves which, as regards their heating properties, embody some meritorious points. They are cylindrical in form, but over the cylinder are placed one above the other a series of gilled sections or rings, fitting one into the other by means of tongued and grooved joints. These gills, besides radiating outwards, have a tendency to send it upwards, as they are cast with their angles elevated. The advantage of this arrangement is that the sectional division of gills allows the metal of which they are composed to contract and expand readily, and without fear of cracking, and as the parts are interchangeable, in case of an accident by breaking, a duplicate can be sent and put in place by any person. The gills also increase the heating surface of the fire cylinder to a very large extent, and the inventor claims that it is not necessary to employ fire-clay for the purpose of increasing the heat. They certainly give off an intense heat, and for the amount of work they are capable of effecting are moderate in price. They will burn for twelve hours without attention, and the heads or tops are arranged so that the smoke flues can be placed in any position to suit the requirements of the buildings in which they are fixed. An application of the Premier stove that Mr. Barton has found advantageous and economical, is the enclosing it in a brickwork chamber in one room, drawing the outer air to this chamber, which when heated is admitted to the room in which the stove is fixed and to an adjoining one, but this, of course, is only applicable to public buildings; and another is by fixing it in a lower apartment under the same conditions and carrying the heated air to rooms above. In these features it tends materially to reduce smoke, as one fire may be made to heat two or even three rooms, according to the capacity of both.

Amongst the few local manufacturers of domestic grates and stoves, Messrs. Shorland & Co., St. Gabriel's Works, Manchester, occupied a prominent position. Messrs. Shorland's system of ventilation and heating by means of the sitting-room grate is well known throughout the North of England, and was illustrated in our report of the South Kensington Exhibition. The system is simple and effective, and consists in bringing in a large amount of fresh air from the outer atmosphere, warming it in a specially constructed chamber, and delivering it in part in the room in which the grate is fixed, and carrying the surplus heat to the next floor, where it may be utilised to warm one or more bedrooms, or the passage or landing; which is effected by carrying pipes from the heating chamber to the spot where the heat is required. Messrs. Shorland show how very easy it is, by a properly arranged method, to utilise the heat that is under ordinary circumstances wasted in the chimney for warming the next floor, and so dispensing with additional fires, and their attendant dust, dirt, loss of time, etc. In carrying out this principle in stoves for large buildings, such as banks, churches, etc., the whole heat obtained by the warming of the air admitted from the outer atmosphere is discharged into the building. We append an engraving of such a stove, in which the pipes from the exterior are brought to a position inside the perforated top, and according to the size of the stove, and its ability to disseminate heat, may be one, two, or three; and it has been practically proved by this system that rooms which it has been hitherto considered impossible to thoroughly warm, have been kept at a comfortable and equable temperature by these stoves.

Messrs. Shorland introduced a new domestic grate at this Exhibition, which in addition to the system already explained, is based upon the principle of consuming a large portion of its smoke, and is arranged for an up and down

draught. We saw this grate under test, and were favourably impressed with the results, but shall probably have an opportunity in a future number of presenting to our readers an engraving and more detailed description of this invention.

The Gas Meter Company, Limited, through their Manchester agents, J. and T. L. Archer, show among other meters their Specialité, the Reliance Patent Gas-meter, the great advantage of which is that the gas bears an even pressure upon the whole surface of the water instead of (as in ordinary meters) upon the front compartment, so that it is impossible for the registration to vary under any pressure. They are also now making a meter for gas-stoves, fires, etc., in order that a consumer can see the exact amount of gas used and the cost saved in comparison with other methods.

The Hon. J. W. Plunkett, 15, Park Square, London, N.W., exhibited an Automatic Safety Gas-tap of his own invention, which is patented and is for sale. It provides a safeguard against escape of gas or explosions, and causes the tap to turn itself off in the event of the gas being blown out, or turned off at the main. The invention, in all probability, in the hands of a practical man may be simplified or advantageously altered. The idea is original and decidedly ingenious in its arrangements.

Messrs. George Bray & Co., the well-known gas lighting engineers of Leeds, were present with a collection of their celebrated gas-burners and powerful street lamps to a maximum of 800 candle power. Lamps of Messrs. Bray's make are now in extensive use in the Metropolis and most of the principal towns in the kingdom, and appear to give universal satisfaction wherever fixed, their economy per candle power obtained being proverbial. These lamps were fully described and illustrated in the SANITARY RECORD of October last. Bray's burners, which have gained a world-wide reputation, are remarkable for their superior make, their non-corrosive character, and their cheapness, and are probably as extensively used as any others made. They provide perfect combustion with the smallest consumption of gas, and, by the arrangement of the globes and holders, the greatest utilisation of the light.

Mr. Joseph Constantine, Oxford Street, Manchester, exhibited the Convoluted Stove with which his name has become associated. These stoves having been long before the public, do not need a detailed description. The name alone would imply that they present a large heating and radiating surface, which is the case; contraction, and expansion of the metal are also provided for, and as they are lined with fire-clay slabs, slow combustion is the result, economising fuel and minimising smoke for the amount of heat given off. They are made in several sizes, and are admirably adapted for warming large buildings.

Mr. James Proctor, Hammerton Iron Works, Burnley, whose Patent Mechanical Stoker we described at length in connection with the South Kensington Exhibition, was present here with this excellent appliance.

All the other grates or stoves of interest exhibited at Manchester, have, we think, been reported upon in our account of the South Kensington Exhibition.

We are prevented from describing Mr. Braham's Fire Alarm, in connection with this Exhibition, in consequence of the engravings not being ready.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BASFORD RURAL.—A large portion of Mr. Whitgreave's excellent report is devoted to an appeal to his Authority for the provision of hospital accommodation for cases of infectious disease. The necessity for such provision was fatally shown by the havoc played by scarlet fever, which caused nearly ten per cent. of the total mortality; and a district of so great a population, and lying so near large towns, ought certainly not to be without some accommodation of this kind. The outbreaks of scarlet fever and measles led to the discovery of many insanitary conditions, necessitating no less than two thousand three hundred visits and investigations. Many schools were closed; and Mr. Whitgreave mentions the cordial assistance which the medical men of the district rendered him in reporting no less than 227 cases of infectious disease in separate houses. Sewerage works are progressing rapidly in many parts of the district, but improvement is urgently needed in the Carlton District, where, of 168 deaths, 100 were those of children under five years of age. During the year there were 1895 births (95 of which were illegitimate) and 991 deaths, giving rates of 38.34 and 20.05 per 1000 respectively. The deaths from diseases of the chest (158) show a considerable decrease from those reported for 1879, when the number was 225. Diarrhœa was fatal in 64 cases, measles in 41, enteric fever and whooping-cough of 13 each. Appended to Mr. Whitgreave's report is that of the Sanitary Inspector's, who reports some improvement in the water-supply and in general sanitary conditions.

HACKNEY.—The extreme prevalence of small-pox in Hackney during the past ten years, and the outbreak again in 1880 after a very limited period of cessation, has induced Dr. Tripe, in his exhaustive report for 1880, to devote considerable attention to the subject. He shows that while small-pox was very prevalent and fatal in 1871-72, very few cases happened in 1873, 1874, and 1875; but the disease became again epidemic in Hackney in 1876, when 480 cases were reported to the Health Officer, and 92 deaths registered. In that year the deaths in the whole of London were only 735, so that one-eighth of all the deaths from small-pox occurred amongst Hackney parishioners. At some length Dr. Tripe discusses the question whether a small-pox hospital is necessarily dangerous to the persons living near it, and later on argues the important points as to what extent the infection of small-pox can be carried by the air, and how much of the disease is attributable to direct infection by means of ambulances, by visitors and tradespeople going to the hospital, and by transmission by the sick themselves. As Dr. Tripe has now held for twenty-five years the position which he has so ably filled of Medical Officer of Health for Hackney, he gives in his report a short *résumé* of the work carried out in the sanitary department during his tenure of office. It appears, from the record of work, that 6965 cesspools have been emptied, filled up, and drained into the sewer; no less than 10,896 choked drains have been either cleansed, repaired, or reconstructed as the case required; 5426 new traps have been provided to the inlets of the drains; 32,214 houses have been whitewashed, cleansed, and repaired; 5931 houses have been disinfected and cleansed after zymotic disease had appeared therein; and 5094 dust bins have been provided. Additional means of ventilation have also been provided in 2939 houses, and a better water supply, or water supply apparatus, provided in 5119 houses. There have also been 16,666 other nuisances abated, without including the very large number of requests to remove dust, which have been attended to. This is a goodly list, and accounts, in the Health Officer's opinion, to a great extent for the low death rate of the district. It is satisfactory to note that notwithstanding the enormous increase to the population of Hackney, the death-rate has really declined. In 1880 the total births and deaths were 6462 and 3321, respectively, these figures being equal to rates of 35 6 and 21.6 per 1000 of population. Of the total deaths 623 were caused by zymotic diseases, this class accounting for 18.8 per cent. of the total mortality. Amongst children a high mortality is reported, no less than 44.8 per cent. of the total deaths being those of children under five years of age.

HANDSWORTH.—The death-rate of this district in 1880 compares favourably with that of former years, and infectious diseases were not prevalent. The birth-rate for the year was 31.5 per 1,000; the death-rate, 12.5 per 1,000. Of the 288 deaths, 82 were infants under the age of twelve months, the chief causes of mortality being infantile diarrhœa and premature birth. Between the ages of one and five, 30 deaths were registered, and 79 deaths occurred in persons aged sixty years and upwards. Zymotic diseases caused 45 deaths, or 15.6 per cent. of the total mortality. These deaths were below the averages of the seven previous years, and would have been much lower but for the prevalence during the third quarter of infantile diarrhœa. A good deal of sanitary improvement seems to be going on under the auspices of Dr. Welch.

HENDON.—Based upon a population of 9,299 souls, the birth and death-rates of this district were last year 34.9 and 16.5 per 1,000 respectively. Of the total number of 154 deaths, 22 were due to zymotic causes, equal to a rate of 2.1 per 1,000. Small-pox was introduced into the district in April by two tramps in search of work, and an interesting description is given by Dr. Cameron of the way in which the infection spread from these cases to others. Altogether, 17 persons were attacked, 3 of whom died. Numerous cases of scarlet fever appeared, and measles of a mild type were more or less epidemic throughout the parish during the greater part of the year, the cases which occurred being estimated at from 300 to 400, though only one death took place. Towards the autumn, the disease abated, and it had almost disappeared before the end of the year. The need of some accommodation for the isolation of infectious cases is strongly urged by the Health Officer, whose efforts have been sadly hampered by its absence. The district is also unprovided with a public mortuary, and, seeing that no less than nineteen inquests were held during the year, it is to be hoped that the sanitary authority will give this matter prompt attention.

HUDDERSFIELD.—In this borough there were 2545 births and 1797 deaths in 1880, equal to rates of 33.79 and 22.05 per 1000. In the first quarter of the year the death-rate was 20.02, in the second 20.91. In the third quarter it rose to 23.51, and in the last quarter it was as high as 23.75. The increased death-rate at the close of the year was occasioned by the deaths from fever, which rose from 6 to 44. During this quarter the deaths were 484, as compared with 479 in the previous quarter. Dr. Cameron devotes considerable attention to the alarming prevalence of fever, which he attributes chiefly to local drain poisoning rather than to any flagrant defects in the public sewers.

The total deaths from 'fever' were 55, three of which happened in the workhouse. Diarrhœa caused 74 deaths, measles 33, and scarlatina 23. Twelve deaths were attributed to whooping-cough, and four to diphtheria. The zymotic death-rate was 2.49 per 1000, against 2.78 and 2.73 respectively for the two preceding years, and an average of 2.73 for the four previous years. The death-rate of children under five years of age was 8.99, against an average of 9.20 for the preceding six years. The Health Officer reports that considerable improvement has been made in the system for the notification of cases of infectious disease occurring in the borough, but points out the necessity for further hospital accommodation. In the fourth quarter of the year no less than 50 cases were admitted into the hospital, against five in the previous quarter. The tables of the Sanitary Inspector, which are appended to the present report, indicate that the current sanitary work of the district is well kept in hand, but Dr. Cameron points out the necessity of additional sewer flushing and ventilation and of a more complete system of nuisance removal. The Health Officer also suggests the establishment of a dairy on proper hygienic principles. In this connection he states :—'My personal inspection of many of the mistals from which our milk in Huddersfield comes, makes me fear that at some not far distant day, unless something of the sort is done, we shall have fever traceable to the milk supply.'

JARROW.—Dr. Bradley did not actually enter upon his duties as Health Officer in succession to Mr. Spear until the beginning of June 1880, but his report shows a laudable attempt to give as complete a sanitary history of the year as possible. He devotes considerable attention to the prevalence of zymotic diseases, which show an improvement on last year, and a decided improvement on the mean for the preceding four years. From 1875 to 1879 the rate was 5.0 per 1000; in 1879 it was 3.3; and in 1880 3.16. Measles was more or less prevalent throughout the year, but towards the end of November the disease became epidemic, as many as thirty cases having been notified in ten days. The outbreak ran its usual course, and terminated fatally in twenty-one cases. Typhus fever, which was so fatally prevalent in 1879, was almost entirely absent from the district, one case only having been heard of during the year. Sixteen cases of scarlet fever were reported, and three deaths. In four instances two members of the same family became affected, but in no instance, except one, was the contagion communicated from one family to another, a fact which the health officer thinks somewhat remarkable, since, as he says, the disease appeared in every ward of the borough and at different seasons, no fewer than sixteen centres of contagion having been discovered. Typhoid fever was somewhat prevalent, 25 persons in all being attacked, and four dying. Upon enquiry, Dr. Bradley found the water-supply and the milk free from blame; but the cause in most cases was found to be bad drainage, insufficient and unsuitable midden accommodation, and the evils produced by the contract system of refuse removal. Thirteen deaths were due to croup and diphtheria, and of these, three only were under five years of age. The health officer, in most cases, associated the keeping of poultry with these diseases, and remarks, that in many instances a filthy pen, where from ten to thirty poultry were cooped, was in close proximity to the apartment where persons suffering from the disease slept, sometimes only a few feet, and seldom more than a few yards intervening. Whooping-cough caused 15 deaths, as compared with 23 in the previous year. All the deaths happened during the first quarter of the year. The general death-rate for the borough was 19.76, against 19.5 in the previous year. Of the total deaths, 137 were due to zymotic causes, whilst 100 deaths were registered from diseases of the respiratory organs, being 18 in excess of those occurring in the previous year.

KENSINGTON.—Dr. Dudfield's report for 1880 shows that he continues to work thoroughly and energetically in his district. A considerable proportion of a voluminous report is devoted to the record of sanitary work. Dr. Dudfield reports that the slaughter-houses and cow-sheds were kept under constant inspection. Whilst admitting that these latter are much better kept than they formerly were, he points out that many alterations and improvements are still necessary in some of them to bring their structural condition into conformity with the provisions of the bye-laws. Imperfect paving appears to be the most prevalent defect. The dairies, cowsheds, and milkshops, were also subjected to a similar inspection, but the health officer adds that this important duty is delegated to a very limited number of officers who have multifarious duties to perform under other Acts. He remarks that 'arrangements such as these are not calculated to ensure the results intended by legislature, and they do not meet with the approval of sanitarians, to whose representations the 34th section of the Act, and the order itself, may be said to be due.' The removal of house refuse was well attended to, and justifies the change made by the vestry in themselves undertaking this important duty. Whilst reporting minor improvements in various directions, Dr. Dudfield deplores that the parish is still unprovided with a mortuary. It is, indeed, a matter of regret, that this important and central district, with a population of 159,700 souls, should be without an establishment for the reception of the dead. Considerable attention is given by the health officer on the subject of the compulsory notification of infectious disease, and to the interruption of education caused by the prevalence of these diseases. During the year there were in the parish 2884 deaths, including those in public institutions, equal to a rate of 18 0 per 1000, being 1.1 below the previous year, and the decennial average. Of the total deaths 347 were from zymotic causes, being 122 more than in 1879. Measles caused 93 deaths, diarrhœa 71, scarlet fever 51, diphtheria 27, and small-pox 22. The deaths of children under five years bear a high ratio to the total deaths, 1,219 being registered in 1880, or 42.3 per cent. of the total deaths.

KING'S NORTON (RURAL).—Improvement continues to be made in this large rural district, although there is yet ample scope for continued activity on the part of the Health Officer and of the Sanitary Authority. The district does not yet possess an infectious hospital of its own; there is an arrangement whereby its infectious patients are sent to Birmingham, but this is open to objection, since the hospital is a long distance from many of the villages in the King's Norton District. The subject is under consideration, and it is to be hoped that the Sanitary Authority will see fit to erect isolation accommodation within its own boundaries. The drainage system progresses, but additional flushing and ventilation seem required, and improvement is needed in the scavenging arrangements. The wells of the district would appear to be generally polluted, since of 64 samples analysed, no less than 36 were found bad, and 19 fair, nine only being returned as good. During the year there were 590 births and 295 deaths, which, deducting those occurring in public institutions, are equal to rates of 38.45 and 17.2 per 1000. A marked decrease is shown in the deaths from zymotic causes, the number in 1880 being 21, with a death-rate of 1.3 per 1000, as compared with 36 for 1879, and a death-rate of 2.39. The prevalence of typhoid fever in the district seems to have attracted the special attention of the health officer, who attributes most of the cases to a polluted water-supply. The infantile death-rate was somewhat high, 91 of the deaths being amongst children under five years of age, whilst 60 of these had not reached the age of twelve months. This mortality is attributed in the main to improper feeding rather than to sanitary defects.

LIVERPOOL.—The population of this city was ascertained at the recent census to be 548,649; and amongst this vast aggregation of people there were in 1880 20,783 births and 14,811 deaths, equal to rates of 38.2 and 27.2 per 1000, respectively. Of the total deaths, 3,173 were due to zymotic causes, 1,028 being from diarrhœa alone. The fatal prevalence of this disease has naturally received considerable attention from Dr. Stopford Taylor. Though diarrhœa was generally prevalent throughout the whole of the city, the greatest mortality occurred in those districts where the houses are most crowded together and the population most dense. The consequence of these insanitary conditions is reflected in the general high rate of infantile mortality

which prevails in those localities, and it can be no matter of surprise that when diarrhœa prevails, the enfeebled constitutions and lowered vitality of the children render them unable to cope with the disease. One hundred and fourteen deaths were returned as due to fever (typhoid, gastric, and enteric), and 87 to typhus; 465 were due to scarlatina, 283 to measles, and 663 to whooping-cough. Tubercular diseases caused 2,007 deaths, 1,337 being attributed to phthisis alone. Considerable extension has been made in the accommodation for the isolation of persons suffering from infectious disease. There is now an additional institution, which is supported partly by voluntary subscriptions and partly by payments by patients, the charges being from 10s. 6d. to £2 2s. per week, according to the accommodation required. The Corporation contributed £5,000 towards the erection of this building, and have also undertaken to pay an annual sum of £250, provided twenty-five beds are placed at the disposal of the Medical Officer of Health at a reduced fee. Some idea of the magnitude of the operations of the department under Dr. Taylor's charge, may be gathered from the fact, that 2,786 cases of disease were reported during the year; 1,463 post-cards were sent to schoolmasters, informing them of the attendance of children from infected houses; 42,099 day visits and 6,444 night visits were made to lodging-houses, 4,059 visits were paid to houses for the purpose of disinfection; 29,588 articles were brought to the disinfecting apparatus for disinfection, and 152 tons of meat and 92 tons of fish were seized and destroyed as unwholesome.

MERTHYR TYDFIL RURAL.—The task of systematic inspection must be one of considerable difficulty in a district such as this, which contains a straggling population of some 17,000 souls, spread over a large area. Mr. Dyke has, however, done his work in this respect in a most satisfactory and praiseworthy manner. Many improvements resulted from these inspections, whilst the discovery of existing defects led to speedy amelioration and general improvement. In many ways progress has been made, and notably in the water-supply, but there are still parts of the district which need the serious attention of the Sanitary Authority. At Newtown Bute and Carno-Bute the pollution of the water-supply is still permitted, and Mr. Dyke regrets that his recommendations, so often urged, have not yet been fully attended to. The total births and deaths were 532 and 346 respectively, equal to rates of 30.7 and 20.3 per 1000. The infantile death-rate is still somewhat excessive, but this is accounted for by the cold and elevated situation of many parts of the district. Chest diseases were fatal in 76 cases, consumption in 60 cases, and cancer in 7. Only two deaths were due to diarrhœa, and these were of young infants.

MID-WARWICKSHIRE.—Great strides were made towards improving the general sanitary condition of this combination during 1880 and previous years. At Warwick new and extensive water-works have been constructed, and great improvement effected in the ventilation and flushing of the sewers, combined with a general extension of drainage and water-supply. In the Solihull district, works of an extensive nature have been carried out, chiefly in constructing drainage systems, whilst in most of the other districts improvements more or less important have been effected. Alluding to the question of water-supply, Dr. Wilson remarks, 'very little has been required or will be required in the greater portion of the rural districts which overlay the red sandstone, but in Rugby and Southam Rural Districts, which overlay the Lias formation, questions with regard to water-supply are constantly cropping up, and as a rule, are of more importance than questions of drainage'. In the matter of hospital accommodation the combination ranks high, the only three districts which are not provided with such accommodation are the Meriden, Rugby, and Southam Rural Districts. As regards the removal of nuisances and other sanitary defects, continuous and steady progress has been made in all the districts. 'Dr. Wilson estimates the population of his district, which covers an area of 291,290 acres, at 96,604. In 1880 there were in the district 2,771 births and 1,759 deaths, representing birth- and death-rates of 28.6 and 18.5 per 1000 respectively. To zymotic causes 181 deaths were ascribed, equal to a death-rate of 1.8 per 1000, or 1.5 lower than the average rate of England and Wales. More than one-half of these deaths (107) were caused by diarrhœa, infants under one year of age being the chief sufferers. The disease was most prevalent during the third quarter of the year, when the temperature was unusually high. Scarlatina was largely prevalent in the Rugby, Southam, Warwick, and Meriden Rural Districts, where in five cases the elementary schools were closed. In all, there were 41 fatal cases of this disease, seven of which happened in the Warwick hospital, and properly belonged to Leamington. In most cases Dr. Wilson attributes the spread of the disease to agency of schools. In this connection, the absence of some system requiring the compulsory notification of infectious disease is deplored by Dr. Wilson, who says:—'At present, the only cases which are bound to be reported to the sanitary officials are cases of infectious disease occurring among paupers, but generally I find medical men so willing to report cases occurring in private practice, that it would be wise economy on the part of the Sanitary Authorities to pay a stated fee for every such certificate, on the condition of course, that all cases occurring in private practice should be reported.' Although only five deaths occurred from diphtheria, there was an alarming outbreak of throat disease at Rugby, where more than 100 persons were affected. Dr. Wilson gives a most interesting account of this outbreak, which he traced unerringly to the drinking of the milk supplied by a particular dealer.

NEWCASTLE-ON-TYNE.—The death-rate in this borough last year was the lowest that has been recorded, and has only once been reached during the last 13 years; but, nevertheless, Mr. Armstrong is forced to admit that the sanitary condition of Newcastle, as evidenced by its mortality, is still below what may be reasonably considered an attainable standard. During the past year, there were 5,435 births and 3,335 deaths, representing annual rates of 36.4 and 22.3 per 1000 respectively. Zymotic diseases show a decline from 3.7 per 1000 in 1879 to 3.3. Diarrhœa was the most prevalent of this class of disease, being credited with 172 deaths; scarlet fever ranking next with 141. Whooping-cough was fatal in 129 cases, measles in 15, and enteric fever in 30. The dairies and cowsheds were kept under constant supervision, and many improved in drainage and ventilation. Several slaughter-houses were reported defective, but the regulations relating to these houses are imperfect, and do not appear to be enforced with sufficient strictness. The work of nuisance removal was well attended to, no less than 4,271 having been dealt with during the year. Disinfection was accomplished by the Inspectors after 446 cases of infectious disease of different kinds, less than half the number dealt with in 1879. But notwithstanding this considerable decrease, the number of individual articles disinfected has been much greater than in the previous year, showing, Mr. Armstrong thinks, that the prejudice against removal of articles for disinfection is gradually being overcome. It is satisfactory to be able to chronicle that the examination of plans for proposed buildings, and the controlling of those that are approved, is now one of the regular duties of the Medical Officer of Health of the town, who seems in this, as in other departments of his work, to be at once diligent, careful, and enthusiastic.

PORTSMOUTH.—The health statistics of this important borough present some interesting characteristics. Whilst possessing the lowest death-rate of any large town in the kingdom, it is third on the list for fever mortality, yet as regards the mean duration of life, the inhabitants head the list, their average length of life being two years more than that of any other town in the Registrar-General's list. In the year 1880, diphtheria and 'fever' were very fatal in the town, no less than 90 deaths being registered as due to these causes. Dr. Sykes refers to the outbreak of enteric fever as the outcome of defective drainage arrangements which exist in the town. In most cases, the house-drains are still connected with the town sewers, and the Health Officer found an almost universal

neglect of ventilation in these drains. Moreover, Portsmouth, with a population of some 134,235 souls, is without a proper sewer outfall. 'For a great portion of the day,' Dr. Sykes states, 'the sewers in certain parts of the town are full, or, in other words, are huge cesspits.' The Health Officer dwells at some length upon the defective sanitation existing in many houses, illustrating his remarks with diagrams. The attention of the Town Council is also drawn to the absence of any system requiring the notification of infectious diseases, a system which, Dr. Sykes states, cannot but be of value in isolating the first cases of this class of disease, and thereby reducing the chance of an epidemic. The birth and death rates for the year are, respectively, 32.77 and 18.7 per 1000. Of the total deaths (2,514) 381 were due to zymotic causes. 'Fever' was responsible for 70 deaths, whooping-cough for 48, measles for 42, and diphtheria for 20. Tubercular disease (including phthisis) caused 315 deaths, and pulmonary diseases 461.

ROTHERHAM.—Dr. Hardwicke regrets to report for 1880 an increased death-rate of 20.16 per 1000, which is in excess of 1879 by nearly 3 per cent. Scarlet fever, which was present throughout the whole year in epidemic proportions, was extremely fatal, and there is an increase in the number of deaths from diseases of the respiratory organs. The Health Officer regards the unhealthy character of some portions of a newly-acquired district as, in a measure, responsible for the increase of the death-roll. Whilst admitting that scarlet fever was unusually prevalent, Dr. Hardwicke fails to devote any portion of his report to its probable causation, or to any efforts which may have been taken for its prevention. During the year there were 1,428 births and 739 deaths, 45 of which, however, happened in the workhouse and in the hospital attached to the borough. The health statistics show a decline in the deaths from zymotic causes, 88 only being registered, against an average of 111. Scarlet fever was the prevailing zymotic, the attacks terminating fatally in 45 cases. Sixteen deaths were registered as due to diarrhœa, 9 to 'fever,' 9 to whooping-cough, and 4 to measles. There was a total absence of small-pox. The infantile death-rate shows a decline, a fact which the Health Officer considers to be much in favour of the improved sanitary condition of the borough. An analysis of the water-supply showed that, on the whole, the supply was well suited for drinking and domestic purposes. Considerable improvement was made in some parts of the borough, where 'something like 30 dwelling-houses, replete with insanitary conditions, have been replaced by good paved streets and open spaces'. Improvement, however, is greatly needed in some parts of the recently added districts.

TENDRING RURAL.—Dr. Cook regrets that little has been done respecting the drainage of some of the most populous places in his district, which now, including recent additions, covers an area of 85,327 acres, and possesses a population of 24,797 souls. At Clacton-on-Sea, a rising watering-place, a proposed new drainage scheme still remains *in statu quo*. Four different schemes for draining on to irrigated ground have been proposed and considered, but each has been abandoned on account of the great difficulty of obtaining suitable ground. An improvement, however, is noted in the water-supply of Clacton. Dr. Cook draws the attention of the Local Authority to the necessity of hospital accommodation for the isolation of cases of infectious disease, and he rightly points out that the accommodation should not be provided on the ground belonging to the workhouse. The natural increase to the population was 235, there having been 641 births and 406 deaths during the year. Scarlet fever was the most prevalent zymotic, 81 cases occurring, and 17 deaths. Measles and whooping-cough also prevailed, and at Brightlingsea there was a serious outbreak of diphtheria in December, ascribed to the drinking of polluted water.

WALKER-ON-TYNE.—Amongst a population estimated roughly at 9,000, there were 381 births and 212 deaths in 1880, equal to rates of 42.3 and 23.5 per 1000. Mr. Frazer Hurst seems to ascribe to outbreaks of measles and whooping-cough, the responsibility for the high death-rate, though there would seem from the figures to have been other causes at work. The absence of tables, however, prevents any judgment being formed on the subject. The sewerage of part of the district is reported as very unsatisfactory, and there seems to be much nuisance in the removal of refuse. The Local Board do not appear to be as anxious for the improvement of their district as could be wished, and Mr. Hurst especially regrets their reluctance to provide a hospital for infectious cases.

WEST SUSSEX COMBINATION.—In the whole combined sanitary district there were 2,614 births and 1,287 deaths, which, taking the population in the middle of the year at 86,146, represents rates of 30.3 and 14.9 per 1,000 respectively for 1880. The low birth-rate Dr. Kelly holds to be due to the distribution of the population at various ages; the emigration of young people to large towns bringing about an excessive proportion of old people in rural districts, while in seaside towns there is an excess of children and unmarried women, due to the existence of schools and lodging-houses. From these causes, the relative proportion of child-bearing women to the general population is less than usual, and hence the birth-rate is low. The infantile mortality during 1880 was at the rate of 101 deaths to every 1,000 infants born, against 107, 107, 85, 101, and 88 for the five preceding years. The zymotic deaths, however, were somewhat higher, 171 occurring, against 79 in the previous year. Of the total deaths, 55 were due to whooping-cough; diarrhœa was fatal in 49 cases; enteric fever in 15; scarlatina in 9; and diphtheria in 12. Phthisis caused 130 deaths, and diseases of the chest are responsible for 204, and heart disease for 90; whilst 662 deaths are attributed to other causes. Evidence of sanitary improvement are not wanting in Dr. Kelly's reports, but there seems ample scope for renewed and continuous activity on the part of the Sanitary Authorities. In parts of the Steyning Rural District building by-laws are in operation, and some steps were taken at Horsham to prevent the pollution of the river Arun by sewage matter. At Petworth, a new system of drainage has been completed, but at present no connections have been made with the house-drains. In other respects the system seems useless, since there is no means whereby they can be effectually flushed. The water-supply of the town is in the same state now as it was six years ago. In the Rural Sanitary District of East Preston, steps have been taken towards providing West Tarring with water, an arrangement much needed in the Westbourn Rural District.

WILLESDEN.—It is a matter of regret that this important district has not yet decided upon some final scheme of main drainage. Alluding to this question, Dr. Danford Thomas states:—'As many years as the Board has been in existence, so many schemes for the drainage of the district have been presented by the surveyor and considered. None of them have yet been adopted; I have done my utmost to urge upon the Board the necessity of adopting some plan, but difficulties appeared when least expected, and no general system has, up to the present time, been carried out, though much deliberation from time to time has taken place'. The district appears to have been kept under constant and systematic inspection, and the current sanitary work well kept in hand. The ditches described by the health officer as 'the standing nuisances of the district' have been dealt with as heretofore, some being cleaned by the owners and some by the Sanitary Board. Alluding to the operation of the building by-laws, the health officer advocates the appointment of an Inspector of Buildings, which he thinks would be a boon to the district, since at present, only the more glaring kinds of neglect come before the Board. An independent analysis of the two waters supplied to the district, showed that they were upon the whole satisfactory. Dr. Thomas, alluding to the milk-supply, urges the Board to obtain the services of a public analyst. He has good reason for believing that milk, not only adulterated with water, but manufactured with the aid of Swiss milk, has been offered for sale in some parts of this district. In view of the large number of deaths amongst children recorded as from marasmus, debility, inanition, malnutrition, convulsions, etc., and traceable to causes

arising from improper feeding, as well as of the fact that milk is often the only food which invalids and the sick in various stages of disease are able to digest. It is much to be hoped that the Board will see fit to adopt Dr. Thomas's excellent suggestion. Last year the birth- and death-rates of Willesden were 38.3 and 18.6 per 1000. In the outer ring of London the death-rate was 16.2, varying from 12.1 in Croydon to 22.0 in West Ham, and having regard to this, Dr. Thomas does not think that the rate for his district compares unfavourably with other London suburbs. The alarmingly high infantile rate is, however, a great blot on the district, since, of the 471 deaths, 277 were of children under five years of age; and of the total of 119 deaths occasioned by zymotic diseases, no less than 100 occurred in children.

SANITARY INSPECTORS' REPORTS.

ASTON RURAL.—In his summary of the sanitary work done in this district during the past year, Mr. N. Deeks includes some interesting statistics. Forty plans of new houses and two of new roads have been approved by the Sanitary Committee. The current sanitary work included the inspection of the bakehouses and slaughter-houses, the disinfection and limewashing of houses, the removal of house refuse, and the abatement of smoke nuisances. Of 23 samples of water collected by Mr. Deeks, no less than 22 were condemned as unfit for drinking; in eight cases, wells were cleaned out and repaired, and in four, new wells were constructed, while 17 houses were supplied with tap water. During the year, 52 ashpits were emptied, 26 new privies and ashpits built, and 63 house-drains repaired and put in order.

HARBORNE.—Mr. Worrall's reports on this district are always interesting and practical, and reveal much intelligent appreciation of the proper functions of a Sanitary Inspector. In the report for the year ended the 15th March 1882, Mr. Worrall reports 333 nuisances dealt with, as against 338 for the preceding year. Those arising from defective drainage, improper sink-drains, and foul and dilapidated privies and ashpits, were more numerous last year. Mr. Worrall records an increasing appreciation by the public of the services of the Sanitary Inspector, whose advice has been sought on a number of occasions. The contract for the removal of night soil is reported as having been performed in a very satisfactory manner; but Mr. Worrall states that many of the ashpits in the district are much too large, the contents, in some instances, remaining in them a considerable time, and endangering the purity of the water-supply. Of 27 samples of water submitted to the public analyst, no less than 21 were certified to be so polluted as to be injurious to health. Scarlet fever occurred during the year in about 40 cases, and there were also only 5 cases of diphtheria, 2 of which were fatal.

KING'S NORTON RURAL.—Mr. A. Lennox Clarke did not succeed to the Sanitary Inspectorship of this district until April, and his report only dates from that period. The prevalence of diphtheria and scarlet fever in some parts of the district led to the fumigation of 32 houses; and the complaints of the smells from the manholes to the blocking of eight of these constructions. At King's Heath, the offensive pools and ditches have necessitated a new scheme of drainage, the nuisance having been remedied temporarily, pending the completion of the sewers. An offensive accumulation of filth at a 'tip' was removed, the tipping stopped, and whole area covered with soil and planted with grass. Upwards of 34 samples of water were taken from the pumps and wells in various portions of the district. The majority of these were found impure by the Medical Officer, the cause of the contamination, in the Inspector's opinion, being the close proximity of privy ash-pits. In the matter of private drainage, about fifty connections to the main sewer were made, but a large quantity still remain unconnected. The flushing of the sewers by means of a water cart has been stopped, pending the decision of the Sanitary Authority to adopt a more effectual mode, and attention is rightly drawn to the importance of an early decision being arrived at. The Inspector appends a list of the nuisances removed on service of notice, from which it appears that no less than 415 such nuisances have been reported and remedied.

TODMORDEN.—This district has now a population of 23,861 souls, spread over an area of 16,000 acres, and in submitting his report for the past year, Mr. Blackburn explains that it is in a fair sanitary condition. The chief defect hitherto existing has been the absence of a proper supply of water, but improvement is now promised in this respect. The Inspector appears to have been very active in his district, and he shows that no less than 19,800 privies were emptied during the year, and that the total number of nuisances abated amounted to 46. It is significant that the number of complaints received during the year was only five, and the number of houses inspected was as low as three.

TORQUAY.—In presenting his fourth annual report, Mr. Charles McMahon explains that the work of sanitary improvement continues to progress. A most important advance was made in drain ventilation, no less than 135 shafts having been fixed during the past year, making a total of over 600 in three years and nine months. Improvement has also been effected in house drainage, the work including the ventilation of 90 soil-pipes and of 45 house-drains, while in 72 cases scullery, pantry, and other water-pipes have been cut off. Particulars are also given of the construction of new w.c.'s, of the fixture of new drains, and of the removal of house refuse. During the year, as many as 303 separate houses and premises were visited and dealt with. Mr. MacMahon adds that his suggestions are received and carried out with promptness, and, in most instances, with cordial thanks for the assistance rendered.

WALSALL.—The report of Messrs. Stephens and Harries, the Nuisance Inspectors for the first and second districts of this borough, are very complete. In the first district, the total number of notices served amounted to 1,588, and in the second, 1,553. No less than 2,141 were to cleanse privy middens, while 607 were to remedy defective drainage, defective and dilapidated privies, water-closets, ashpits, and yards. In eleven cases, proceedings were taken before the justices, and convictions obtained in each case. In addition to the usual inspection of the slaughter-houses, a house-to-house visitation was made, the total number of establishments visited amounting to 5,786. In some cases overcrowding was discovered, but not to any serious extent, and but few houses were found to be unfit for habitation.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

ARTIZANS' DWELLINGS.

1881. *Badham* v. *Marris*. "Artizans Dwellings Act, 1875," s. 20—If any interference with ancient lights occurs in consequence of proceedings under this Act, compensation may be recovered from the Local Authority. (45 L.T., 579.)

MEETINGS.

1881. *Drake* v. *Foottit*. "Riot Act," 1 Geo. I, st. 2, c. 5, s. 1—The Hundred is not liable for the acts of a mob, unless the mob evinces an intention to destroy wholly or in part—Hundred held not liable for the mere theft of goods from a house attacked tumultuously by rioters—Various cases cited. (50 L.J., M.C., 141; 45 L.T., 798.)

COMMONS.

1881. *Laws* v. *Ettringham*. 24 & 25 Vict., c. 97, s. 52—Damage to grass on Town Moor by bowling—Prosecution by Committee representing the Freemen who had rights of pasturage—Rights of Freemen held merely incorporeal, the soil and grass being vested in the Municipal Corporation—Freemen's Committee therefore not entitled to prosecute. (51 L.J., M.C., 13; L.R., 8 Q.B.D., 283; 46 L.T., 64; 46 J.P., 230.)

WIDTH OF STREET.

1881. *Metrop. B. W.* v. *Steed.* "Metropolis Management Amendment Act, 1862," s. 98—Street not open at both ends held to contravene the Act, although of specified width. (51 L.J., M.C., 22; L.R., 8 Q.B.D., 445; 45 L.T., 611; 46 J.P., 199.)

HIGHWAYS.

1881. *Raglan H. B.* v. *Monmouth Steam Mills Co.* "Highway Act," 1878, s. 23—"Extraordinary Traffic"—Haulage of timber in a District where timber had long been a common article of trade held not to be "extraordinary traffic", although it was only at intervals of some years that particular coppices being cut unusual traffic occurred. (45 J.P., 812.)

LIABILITY OF TENANTS.

1857. *Reg.* v. *Boyle.* Insufficient description in Poor-Rate Book—Occupiers described as "Tenants of Common", with no mention of their names—Description held insufficient to fix J. B. and others, the actual occupiers, with liability which would have attached them as occupiers had they been specifically named. (7 Cox, C.C., 428.)

CONTRACT WITH A MUNICIPAL CORPORATION.

1872. *Reg.* v. *Franklin.* A contractor held disqualified from being elected member of a Corporation, even though he had, before the election (but without the privity of the Corporation), purported to assign his contract to a third person—A vote given for a disqualified person is not a mere nullity unless the voter had notice of the disqualification; and therefore if a disqualified candidate has a majority of votes a defeated candidate cannot claim the seat by means of a scrutiny. (6 Ir. R., C.L., 239.)

ENTRY IN RATE-BOOK.

1851. *Reg.* v. *Higgins.* "Occupier of property described in a Poor-Rate Book, not by a definite name, but only as "Reps. [= Representatives] of T. Kavanagh"—Such description held, *primâ facie*, good; and only to be objected to by formal appeal from the Rate. (2 Ir. C. L. R., 213.)

PARISH ACCOUNTS.

1832. *Rex.* v. *Norfolk J J.* 17 Geo. II, c. 38, s. 2—It is discretionary whether Justices commit an outgoing Overseer who neglects or refuses to account. (2 L.J., M.C., 22; 4 B. & Ad., 238.)

PAVING EXPENSES.

1881. *Simcox* v. *Handsworth.* "Public Health Act, 1875," s. 257—Paving expenses—Information laid within the statutory six months, but summons not issued till thirteen months afterwards—Held that the information having been laid in time, payment of the expenses could be enforced. (51 L.J., Q.B.D., 168; L.R., 8 Q.B.D., 39; 45 J.P., 765.)

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

LATENT CAUSATION OF SCARLATINA.

The March number of the SANITARY RECORD gave circulation to a most courageous paper by Dr. Carpenter upon the above subject. Some of the views were so novel and striking, and so much at variance with modern observance in dealing with scarlatina, that I at once said, on reading the paper, 'we shall have some interesting and useful correspondence on this subject in the next number of the RECORD.' Great were my surprise and disappointment in finding that my expectation was not realised. In the absence, therefore, of more competent critics, permit me, Sir, to direct attention to some very important practical matters arising out of a consideration of the paper to which I have alluded.

I think the case may be briefly and broadly stated thus, that, in investigations as to the cause of the origin or continuance of outbreaks of scarlatina, attention has been almost exclusively directed to the persons of previous sufferers, or to direct exfoliations proceding immediately from the bodies of such sufferers. Hence the rigorous watch as to the duration of the desquamating stage; hence long and impracticable periods of quarantine, variously required from six to ten weeks, until every dead particle of visibly shed epithelium has passed from the affected body. Thus, in the same number of the SANITARY RECORD which contained Dr. Carpenter's valuable paper, there was a suggestion from my old friend, Dr. Elliot of Carlisle, that books from a lending library should be scheduled and inspected like the cans of a milk-agent.

Far be it from me, and, I dare say, from the intention of Dr. Carpenter, to make positive affirmation as to the 'possibility' (to use Dr. Elliot's word) of mischief arising in the manner indicated. But Dr. Carpenter turns our thoughts into quite another channel, and it appears to me that he directs us away from the accidental, and occasional, and exceptional, to the usual and prevailing, object of our search; and the value of his suggestion has weight in the same proportion.

It has been said by those with whom I have had private communication on the subject that it is a very *parturiunt montes* to make much of an alleged discovery that the poison of scarlet fever may lurk in drains and sewers and their emanations. 'Surely this we have known long ago', say these discerning readers of your columns. But, I take it, the gist of Dr. Carpenter's paper lies in these words (to which, indeed, attention is drawn by the significant preface, 'What inference do I draw from these cases?'), namely, 'the causation of scarlet fever may AS OFTEN arise from sewage emanations and sewage contaminated with scarlatina germs as from personal contact; and, whilst such contact can undoubtedly spread the disease, there is less danger to be apprehended from this cause if isolation and disinfection have been definite and properly performed.' The words which (through the printer) I have emphasized embody the significance and value of the entire passage.

But Dr. Carpenter has, in practice, the boldness to act according to his opinions; and, if the foregoing enunciation (even with the emphasis I have indicated) should appear a *ridiculus mus*, what will be said of the following? 'I have for many years acted upon the opposite path, restricting the isolation to a fortnight only, and in some cases limiting it to one week after the departure of the fever; and in no case have I had any reason to regret the course which I have adopted.' And yet this diverse procedure from what is customary is only the practical corollary from the views just noted as to the active etiology of the disease.

I submit that if these two conclusions of Dr. Carpenter's be established, it will lead to a practical revolution in our method of dealing preventively with scarlet fever. The cause will be looked for in general insanitary conditions connected with methods for the disposal of refuse, rather than in a minute and searching genealogical inquiry, or a tracing of postal communications, or the use of a library; and, after a fortnight's isolation, abatement of noxious influences will be sought in the disinfection of drains rather than in the prolonged confinement of persons with a disinfected, though continuously desquamating cuticle.

After nine years' unbroken oversight of large sanitary districts, I am anxious to say how entirely my experience accords with that of Dr. Carpenter. In that period my duties have obliged me personally to investigate, and deal remedially with, hundreds of distinct outbreaks of scarlet fever among all classes and conditions of society. A reference to many records would enable me to say in how many instances I have been unable to trace personal contact with those affected with the complaint, either as the originating or the sustaining cause of an epidemic. All that it is necessary to affirm now, is that in a vastly larger number of cases I have found the disease associated with such insanitary faults as obliged the reception into the system of material contaminated by sewer, drain, privy, slaughter-house, or ash-pit emanations. The only addition I would make to the statement of Dr. Carpenter is this, that the disease-producing germ or ferment may be actively

resident in water, more frequently than in milk, but less so than in the air; and the character of the consumed water, no less than of the milk and air, should enter into every inquiry as to outbreaks of scarlatina, or as to places where scarlatina may be an endemic liability.

And the same as to practice. After the departure of the fever, and washing with disinfectants, I have never insisted upon long periods of isolation, nor have I been led to this procedure by any other circumstance than the attainment of satisfactory results. Closing of schools is the ready outcry of the practically inexperienced; but the circumstances must be somewhat exceptional for me to place this amongst the necessary steps in dealing with scarlatina epidemics.

It is, I suppose, matter of certain knowledge that germs require suitable *pabulum* for their nourishment, and development of the activity which, being life to them, is disease and death to us. It has always appeared to me that milk is, in its nature and temperature, the medium which should and does most aptly fulfil, for the germ, these undesirable requirements. Next, perhaps, is air, in certain conjectured meteorological conditions, especially when pervaded with the elements of organic putrefactive fermentation. And finally water, when similarly subject to conditions which deprive it of the great sanitary requisite, purity. But dead scales, the *exuviæ* of an exhausted febrile condition, are not —and certainly not after disinfection—at all relative in character or capabilities to the nutrient substances I have named. This theory may be of the feeblest, and certainly is stated in the baldest and briefest manner. But it is the practice advocated by Dr. Carpenter, to which it bears reference, which, in my judgment, merits the most thorough and painstaking investigation.

JOHN MAKINSON FOX,
M.O.H. Mid-Cheshire Combined Sanitary District.
Lymm, near Warrington, 27th April 1882.

SMOKY CHIMNEYS.

All facts are not brought to light, nor the advantages illustrated, or defects shown, connected with, or having relation to, the subject for which a collection of articles are brought together, and hence denominated *an Exhibition*. The Smoke Abatement Exhibition will have done some good, inasmuch as the object was and is to do away with smoke. But as this will be a matter of time, will it not be well to look at an evil intimately connected with this—that could not be shown at the late Exhibition—viz., of chimney-pots, tallboys, and cowls, that are fixed on the top of chimneys for the purpose of drawing the smoke away from the room in which a fire is alight? Chimney-pots, etc., should not all be condemned; but it is unfortunately the first thing every one flies to as a remedy, and if it fail, another patent, that is sure to be effective, is resorted to. Hence the, not to mention dangerous, but unsightly state of the tops of the houses, say in the neighbourhood between Bond Street and Park Lane, and Oxford Street and Piccadilly. Were the flues properly swept and cored (the writer has serious thoughts of turning sweep himself), the greater part of these sky additions to the house would be dispensed with. To give an example: modern houses are not better built than they were 100 years ago, but the tops of the newer houses are not so burdened with cowls, etc., as the older ones. A moment's thought will explain the reason. Soot, in the course of years, will, in consequence of damp and wet getting down the chimney when the fires are not in use, form a hard cake and adhere to the rough brick-work, so as to considerably reduce the area of the flue. The sweep's brush, which can pass through a 4-inch pipe, has no power to remove these increasing incrustations, consequently the flue is being permanently reduced—until sufficient room is not left for the escape of the smoke. The jobbing builder, or decorator, is called in, who recommends somebody's patent, and sometimes succeeds, by lengthening the flue, in making things a little better for a time. The chimneys of these old houses did not smoke fifty or a hundred years ago. It is evident, then, if they were properly cored (not with a brush merely), they would not smoke now, even without the chimney-pots.

I am not speaking of down-draughts caused by the want of sufficient air to promote combustion and maintain the circulation in the room, but the great evil consequent upon the chimney not being kept something like what is established as the necessary working area. Very lately, the writer had a case at a large building,* when three different chimney-pots, one after another, had been put on a chimney-stack to cure a smoky chimney, each being a patent. They all alike failed to induce an up-draught. Before commencing operations, I lighted a piece of brown paper to try the flue, when the smoke simply dispersed about the room. The sweep was sent for, and I insisted that he should go to the top and drop down his ball, one man being at the bottom by the fire-place. After calling several times, to be sure he was at the right chimney (strange to say no sound could be heard), the ball was let down, and, although but three inches in diameter, would not pass; and it was only by pulling it up and throwing it with great force that a hole was made large enough to allow it to pass through, which eventually was opened to its full size. A fire being afterwards lighted (with the patent of the chimney-pot removed), it has gone perfectly ever since.

According to the writer's experience, the causes of smoky chimneys could be tabulated as follows:—

Inefficient sweeping and cleansing ..	50 per cent.
Careless setting of grates	15 ,,
Excluding fresh air	20 ,,
Adjoining elevations	10 ,,
Short flues	5 ,,
	100

If in this age of Companies, one were started for the purpose of undertaking the thorough cleansing of chimneys, fully one-half of the existing chimney-pots could be taken down, and still leave the rooms more free from smoke and blacks than they now are.

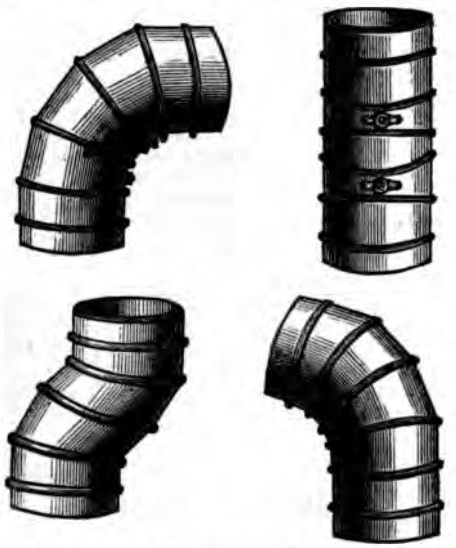
R. H. CRANE.
3, Stockwell Park Road, S.W.

* The Langham Hotel.

SANITARY INVENTIONS.

ADJUSTABLE STOVE AND RAIN PIPE ELBOWS.

MR. W. HARDT, of 165, Pentonville Road, King's Cross, London, N., has called our attention to his Patent Adjustable Stove and Rain Pipe Elbows, which he claims to be easy to fit to any angle or bend, to produce a better draught, to be much more durable than the ordinary square elbows, and to compare favourably with them as to price. The arrangement to get the different bends for the stove pipes



is simply by loosening the eccentric (shown in the illustration), and twisting the different parts of which the elbow is composed until the desired angle is obtained, when the eccentric is tightened and the angle fixed. The rain-pipe elbows are made in zinc in sizes from two to four inches, but without the eccentric fastening. They are easy to fit to any angle, and facilitate the flow of water by presenting no sharp angles. These elbows certainly meet a public want, and are likely to be of service to many trades.

DISINFECTION AND PURIFICATION.

THE following is a thorough plan of disinfection and chemical purification of rooms adopted by Mr. W. J. Lacy, Ringwood Road, West Hill, Wandsworth, who has given this matter his especial study. First pasting up the fireplace, he suspends the bed-clothing, etc., as far as possible on strings across the room, and the bed itself on the backs of chairs, with the case opened (where this permis-

sion can be obtained) to allow the interior to be well exposed to the action of the sulphur (roll) and carbolic acid. The sulphur is burnt in a Morgan's plumbago crucible, which has been found to be by far the best thing for the purpose. The carbolic acid is diffused from one of Calvert's own vaporisers, which will diffuse 14 ozs. of No. 5 in about twenty minutes. In a room 16 ft. square, it is possible to diffuse 6 lbs. of brimstone in about four hours, although it is rarely that so large a quantity is required, 4 lbs. being, as a rule, the maximum quantity needed.

If the medical man in attendance should require it, Mr. Lacy adopts chlorine in preference to sulphurous gas. The chlorine gas is produced by the action of acid Pur Par. on cal. chlorid; he himself recommends the sulphurous method, the chlorine generally requiring twenty-four hours for completion. He makes arrangements to open the windows from the outside, which he effects by a cord fastened to a contrivance screwed underneath the sash. By using a large crucible, it is possible to diffuse 12 lbs. of sulphur during the course of a day, but it is seldom such a large quantity is required. After the pictures, etc., are removed, the crucible is transferred to the hall. This method of disinfection, adopted by Mr. Lacy, has been found to be very efficacious for the destruction of black beetles, cockroaches, bugs, and ants.

THE WESTMINSTER SMOKE-CONSUMING GRATE.

We now illustrate this invention, which was shown at the recent Building Exhibition at the Agricultural Hall, and referred to in the report upon it in the SANITARY RECORD.

As a glance at the diagram will show, it is of the slow combustion type, the bottom being adjacent to the hearth, and composed of fire-clay, as are also the back and sides. The principle of this grate is to introduce a current of hot air in such a position as to meet the products of combustion below the opening to the chimney, and so prevent the formation of carbon in the flue. This is brought about as follows:—Sufficient space is left between the bottom and the hearth to admit a current of air to the back, where a chamber is provided to receive it. Here it becomes heated, and passing through a horizontal aperture as described, the desired object is gained.

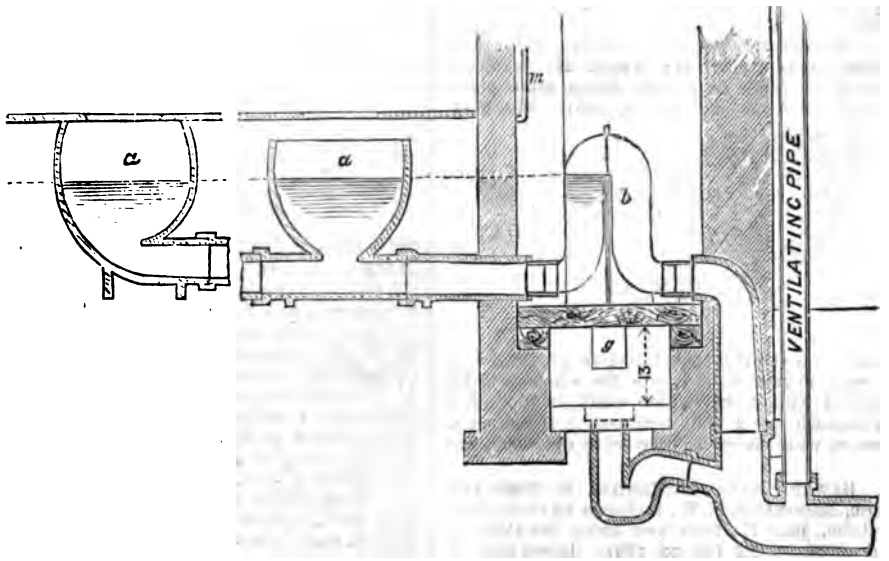
CROSS'S SELF-ACTING TROUGH WATER-CLOSETS.

The accompanying diagram represents a longitudinal section of a system of self-acting latrines or trough water-closets (Cross's patent). As mentioned in the SANITARY RECORD of last month, these were shown at the late Building Exhibition at the Agricultural Hall, and attracted considerable attention. Sanitary Authorities and visitors from Liverpool and other northern towns evinced great interest in these appliances, which are introduced to meet the nuisance of the midden system and common trough-closets so much in use in that part of the country. The concomitant evils of the midden system are so well recognised, that any allusion to them would be superfluous; but the trough water-closet, no doubt a great improvement on the latter, and the best substitute hitherto brought forward, has also many grave objections, amongst which, to better demonstrate the value of Cross's patent, we may mention the following:— 1. They entail a great amount of manual labour, and are consequently liable to be neglected. 2. Proper attention to them necessitates visits from strange men to the closets daily, which, for many reasons, is undesirable; and having control of the water-supply, they probably waste a considerable quantity of water. 3. Should a piece of paper or other substance get between the plug and its seat, as is often the case, the water in the trough gradually escapes, causing great inconvenience and nuisance to the users of the closets.

The special features of the present apparatus, which is very simple and entirely valveless, and meets the above objections, are:—1. They are self-acting, require no manual labour, and cannot therefore get neglected. 2. For the same reason, these closets do not require to be visited daily; but only occasionally; say once in three months, just to see they have not been tampered with; while waste

of water is absolutely impossible, as only a limited quantity can be used, and this cannot be altered by the users. 3. There is no plug, but every time the apparatus works the whole of the troughs are thoroughly flushed all round, and so kept clean and healthy.

The action is as follows, viz.:—A cistern is provided, which holds the same quantity of water as is required in the troughs at one time. At the top of this cistern is fitted a small tank, which is filled by means of a small regulated stream of water constantly running into it, and when full



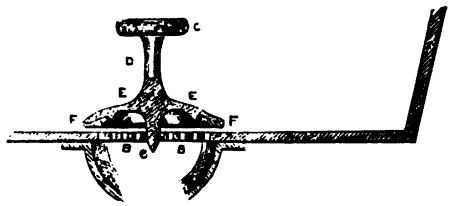
the water runs over into the main cistern. A few inches from the top is situated an overflow pipe, which the water enters as soon as it reaches that height, and runs down into another small tank that is fixed to the siphon (*b*), which, by means of a pulley and weights, moves to and fro from the vertical to a horizontal position. As soon as a certain quantity of water has been received into this latter tank, the weight of the same counterbalances the cast-iron weight, and the siphon pipe suddenly falls to its horizontal position, when the whole contents of the troughs at once rushes into the drain with a great flush. By the time the troughs are empty, the water has left the tank by a small hole in same, and the siphon pipe being thus lightened assumes its vertical position again, and in doing so pulls a wire attached to the tank or tumbler above the main cistern, and causes it to discharge its contents. The water in the cistern is thus suddenly raised to above the top of a siphon supply to troughs, which is immediately started and empties the whole of the contents of the cistern into them: they are then again ready for use. The apparatus is really a great boon, and only needs to be seen in action to be at once appreciated. To give this opportunity to those who are not acquainted with it, we understand Mr. Cross is going to show it again at the forthcoming Exhibition at the Alexandra Palace.

The Duke of Westminster, the Earl of Shaftesbury, the Bishop of Exeter, Lords Aberdare and Mount-Temple, the Baroness Burdett-Coutts, Sir John Lubbock, and other distinguished persons, have consented to become patrons of the recently-formed 'Society for providing Humane and Sanitary Methods of Killing Animals for Food'. The society advocates public 'abattoirs', and efficient inspection of existing slaughter-houses, as well as a reform in the premises and instruments used. Dr. Richardson is the president, and Mr. H. Lester is the honorary secretary, to whom communications are invited from those interested in the movement.

ILLUSTRATED SANITARY PATENTS.

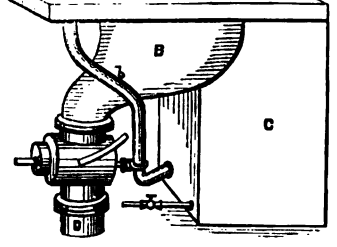
AMERICAN PATENTS.

246,973. WASTE-PIPE COVER FOR SINKS: JOHANNES PERSSON, NEW YORK, N.Y. Filed June 30, 1881. Issued Sept. 13, 1881. *Claim*—1. A waste-pipe cover made in one single solid piece, having a flanged shank D, pointed and threaded at its lower end for attaching it to the perforated portion B. 2. A waste-pipe cover consisting of



the knob C, threaded shank D, flange E, having fastening-tongue *e*, all forming together one piece, in combination with the packing-ring F.

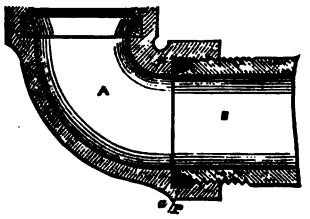
247,210. WATER CLOSET: EDWIN NORTON AND LE GRAND M. NORTON, CHICAGO, ILL. Filed April 19, 1881. Issued Sept. 20, 1881. *Claim*—1. The combination of a water closet bow, with air-compression water-



reservoir C, having open communication with the water supply and a connecting-pipe provided with a valve, whereby, when said valve is opened, the water is suddenly forced into the bowl with the full force of the street-pressure or water supply and that of the compressed air in said reservoir. 2. The combination, with a water closet

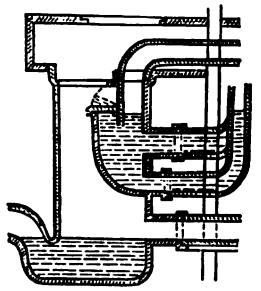
bowl, of an air-compression water-reservoir provided with an open inlet-pipe, whereby the water in said tank is maintained under pressure from the water main or supply and after-wash tank E. 3. The combination, with a water closet bowl, of after-wash tank, and reservoir C, having constant open communication with the water supply, and connecting pipe *b*, provided with a stop-cock. 4. The combination of bowl B, reservoir C, having constant open communication with the water supply, after-wash tank E, connecting pipe *b*, and drain-pipe D, said pipes being provided with valves operated simultaneously by the water closet handle.

248,974. MEANS OF JOINING STEAM, GAS, AND WATER PIPES AND FITTINGS: ADAM N. WINNER, Brooklyn, N.Y., assignor to Joseph Annin, same place. Filed June 20, 1881. Issued Nov. 1, 1881. *Claim*—1.



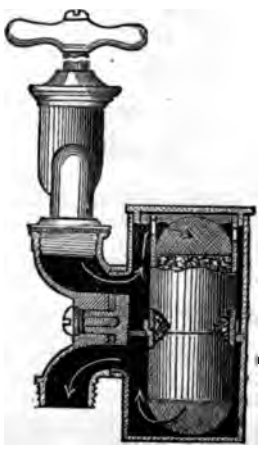
In pipe fittings, the screw-threaded section provided with a bevelled end, in combination with the screw-threaded section provided with a recess, into which is inserted a suitable metal packing. 2. The combination of section A, having recess *a*, with section B, bevelled as described, and packing P.

249,260. SEWER TRAP: ALEXANDER R. ROBB AND RALPH ROBB, BROOKLYN, N.Y., assignors to themselves, James R. Robb, Jane E. Robb, and James McAlley, all of the same place. Filed July 30, 1881. Issued Nov. 8, 1881. *Claim*—A sewer-trap consisting of an upper water-



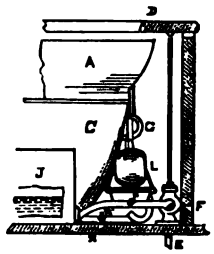
sealing basin and check-valve, in combination with a lower water-seal having the rain-water pipe above the water.

249,339. FILTER: ALMON M. GRANGER, BOSTON, MASS. Filed June 13, 1881. Issued Nov. 8, 1881.



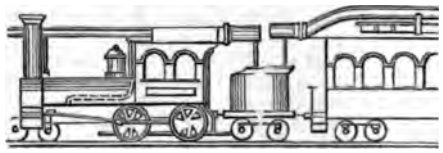
Claim—1. The combination of the filter body, or outer shell, divided transversely and provided with an external valve face or seat, in which are two ports leading to opposite ends of said body or shell, a double liquid chamber, having an external valve seat or face.

249,391. WATER CLOSET: MICHAEL J. O'RIELLEY, BUFFALO, N. Y., assignor of one-fourth to John L. C. Cronyn, same place. Filed May 18, 1881. Issued Nov. 8, 1881. *Claim*—1. In a water closet, the combination, with



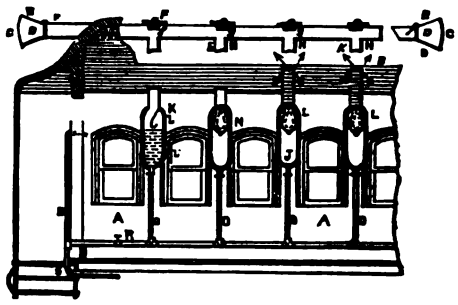
the bowl A and water supply pipe E, of an air-vessel J, a lifting device L *m*, a valve F, operated by the seat, whereby the pipe E is connected with the air-vessel J when the seat is depressed, and the air-vessel connected with the lifting device when the seat is raised, a valve G, which is actuated by the water-pressure in the lifting device, and a pipe *n*, through which the water escapes from the lifting device. 2. The combination, in a water closet, of a bowl A, water-supply pipe E, valve F, provided with two valve disks and seats, opened or closed alternately, air-vessel J, connected with the chamber f^1, lifting device L *m*, connected with the chamber f^2, water-escape pipe *n*, lever o^1, actuated by the lifting device and connected with the valve G, the latter being interposed between the water supply E and the bowl A, and the seat D, whereby the valve F is operated. 3. In a water closet, the combination, with a lifting device, L *m*, of the pipe *n* and stop-cock n^1, whereby the escape of water from the lifting device is regulated. 4. In a water closet, the lifting device composed of a chamber L, and a flexible diaphragm *m*, in combination with the lever o^1 and valve G. 5. The air-vessel J, arranged against the lower contracted portion of the receiving-hopper C, and cast in one piece therewith.

249,220. VENTILATING CARS: JOHN D. BIRMINGHAM, WILKES-BARRE, PA. Filed Dec. 13, 1880. Issued Nov. 8, 1881. *Claim*—The combination, with the pipes extending



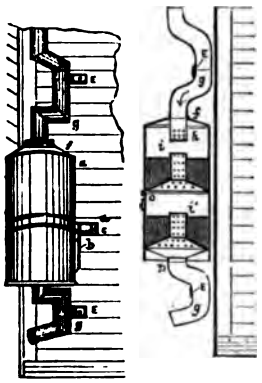
from in front of the locomotive for the purpose of conveying the air to the cars, of the cooling chamber located in advance of the train, whereby the air is cooled before it is admitted into the cars from the pipes extending along and upon the roof of the cars.

249,533. PASSENGER CAR VENTILATION: THOS. P. KINSEY, READING, PA., assignor of one-fourth to David



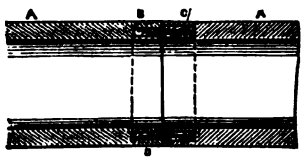
ox, same place. Filed Aug. 17, 1881. Issued Nov. 881. *Claim*—1. In combination with a passenger or car, and placed on a roof of the same, an air-receiving l, preferably of oblong section, extending longitudinally end to end of the car-roof, provided at each end with ged heads B¹, the opening being covered with coarse C, to exclude large cinders, a similar screen D, of finer , placed at the entrance of the box proper, and between wo screens, the open D¹, for the discharge of cinders, ng the screen C. 2. An air-receiving box B, provided openings *f* on its top, and openings *h* beneath, the ings *f* being closed with caps F¹, having secured to inside face deflectors *g*, so arranged with relation to penings *h* as to deflect a certain portion of air through ame, in combination with the connecting pipes H and ucts J on the interior of the car, substantially as de- ed, and for the purpose specified. 3. An air-duct voir or box, J, provided with a deflecting partition, K, ructed as described, having a register opening, J¹, its face, controlled by the usual register wheel plate, er reservoir J², and a boss, J³, combined with the air- ring pipes H and B, above it, with the water pipes and O, P, and R below it, and with the air-distributor L gh spindle and pointer N, as described and for the se set forth. 4. The combination of supply and arge pipes O and P, stand pipes S, return bends S¹, hose couplings T with the air-duct boxes J on the or of a passenger or other car, arranged and con- ed to be controlled in their operation by cocks R, d at each end of and inside the car, said cock being ed to be operated from the outside of the car, sub- ially as shown and for the purpose described. 5. The matic flap-valves E, provided at each end of the air- B, and in combination therewith, arranged to be ved and replaced through an oblong cross slot in the f the box B, said slot being covered by the cap F, to the flap-valve is hung, substantially as shown and ibed. 6. The combination of the air ducts J with ir distributors L, the back of the latter being secured e face of the former, and both in combination with ir-receiving box B, pipe H, and register J¹, as shown or the purpose described.

),538. RAIN WATER FILTER: NATHAN H. LONG, CIE, IND., assignor of one-half to Joseph Shaw, same . Filed June 16, 1881. Issued Nov. 15, 1881. *Claim* In a rain-water filter, the combination of the disks langed rim *o*, and sections *a* and *b*, with the spout *g*,



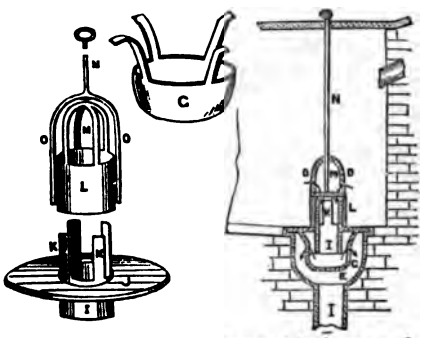
e purpose set forth. 2. The combinations of sections *b*, lid *f*, having a strainer *h*, and spout *g*, with the rated disks *i* and *i*¹, resting on the flange rim *o*, and ved bottom P. 3. In a rain-water filter, the com- ion of the hangers *c*, *d*, and E, with the pipe *g* and ns *a* and *b*, for the purpose set forth.

),594. PIPE-JOINT: OSWALD L. W. DIETZ, CIN- ATI, O. Filed Aug. 23, 1881. Issued Nov. 15, *Claim*—1. As a new article of manufacture, a n of clay pipe having like or symmetrical ends, each provided with a recess, one of which is larger than the other, as set forth. 2. In a pipe-joint for sewers and the



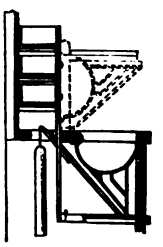
like, the combination of the iron hoop D and the sections A, provided with the annular recesses B and C, filled with cement putty.

250,511. SEWER-TRAP: GEORGE EICHERT, CINCINNATI, OHIO. — Filed June 24, 1881. Issued Dec. 6, 1881. *Brief.*—The outlet nozzle extends below the basin-floor, and the standards rise vertically from it and hold the curb from lateral displacement. The upper end of the curb is provided with orifices, and the handle extending upward



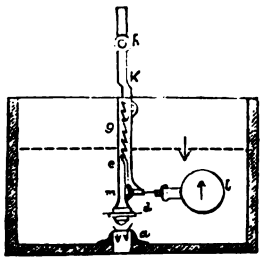
from it terminates in two prongs at its lower end, which are capable of being rotated around the curb. *Claim*—1. The combination of pendent pot G, and outlet nozzle I, below the level of the basin-floor, and within the mouth of the discharge-pipe, with standards K, that rise from the basin floor, and with the elevatable inclosing curb L. 2. The combination, with standards K, that rise from the basin-floor in line with its discharge nozzle, of the curb L M, whose lifting handle, or rod N, is pivoted in the same, and is armed with prongs O, as and for the purposes set forth.

249,601. COMMODE WASHSTAND: WM. T. EGBERT, MORRISTOWN, N.J. Filed Feb. 5, 1881. Issued Nov. 15, 1881. *Claim*—1. The combination, substantially as above set forth, of the commode seat and the washstand attachment, which is constructed to be moved upward and downward relatively to said commode seat. 2. The combina-



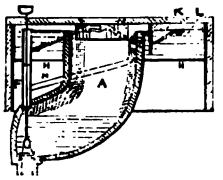
tion, substantially as above set forth, of the commode seat, the washstand attachment covering the same, and the counterpoise for the washstand attachment. 3. The combination, substantially as above set forth, of the commode seat, with a washstand attachment, constructed with a lever top, and with a bottom inclined, forward and downward. 4. The wash-bowl, constructed substantially as above set forth, with a lip at its rear side. 5. The combination, substantially as before set forth, of the wash-bowl, with a discharge-pipe inclined forward, and with a straight overflow-pipe, whereby both the discharge from the bowl and the overflow may be effected at the forward side thereof.

249,696. FLUSHING-VALVE: DAVID THOMPSON, LEEDS, COUNTY OF YORK, ENGLAND, ASSIGNOR TO THE J. L. MOTT IRON WORKS, NEW YORK, N.Y. Filed Sept. 10, 1881. (No model.) Patented in England, July 21, 1879. Issued Nov. 15, 1881. *Claim*—1. The combination of valve *d*, having its stem provided with rachet *g*, slide *h*, pivoted rachet arm *k*, having lugs *p*, pivoted float *l*,



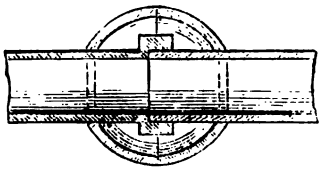
and rachet arms *o*, substantially as shown and described, for operation as set forth. 2. The combination, with valve *d*, and its rachet stem *e*, of rachet arms *o*, operated by a float, to engage the stem, when the valve is raised. 3. The slide *h*, and pivoted rachet arm *k*, in combination with the valve *d*, and rachet stem *e*.

249,767. WATER-CLOSET: ELIAS S. HUTCHINSON, WASHINGTON, D. C. Filed Feb. 9, 1881. Issued Nov. 22, 1881. *Claim*—1. The combination of the bowl or hopper A, flushing tank H, the loose displacement-plate K, the valve rod F, and connections L, for pulling the displace-



ment-plate down within the tank H, on the raising of the valve. 2. The combination of the tank H, displacement-plate or piston K, the syphon M, operating substantially as and for the purpose set forth. 3. The combination of a bowl having a tight discharge-valve and no overflow-connection with the sewer, and a flushing tank on a higher level, having its own overflow independent of the bowl and of the soil-pipe or sewer. 4. A water-closet constructed with a tight discharge-valve, and with a flushing-tank under the seat, having an overflow independent of the bowl and of the sewer.

250,765. BOX-JOINTS FOR SEWER-PIPES: JAS. THOMPSON, CHICAGO, ILL., assignor of one-half to John H. Jett, same place. Filed March 26, 1881. Issued Dec. 13, 1881. *Claim*.—A box-joint, of globular form,



divided into halves vertically, each half having a hole therein, which admits the box being slipped on to the pipe over the joint, the interior of the box being packed with material impervious to gas, the pipe thus supporting the box directly without the use of hinge or key.

THRIFT AND SCIENCE.—The *Univers* professes to explain the mystery of the collection of used postage stamps. It states that the indigo used in printing them being rather expensive, the French Post Office itself buys back the old stamps, and skilled chemists are employed to extract the indigo, so that it may be again employed in making new stamps.

SANITARY JOTTINGS.

SANITARY.

The Improved Industrial Dwellings Company, Limited (Sir Sydney Waterlow's Company), have purchased from the Metropolitan Board of Works nearly two acres of ground in Islington and the Borough. This has been cleared under the Artisans' Dwellings Act, 1875, and buildings for the accommodation of about 1,400 persons of the working class will be forthwith commenced.

The Corporation of Newcastle-upon-Tyne have had under their consideration for a long time the question of providing increased and improved accommodation for fever patients. Much opposition has been manifested to all the sites and plans hitherto proposed; and at the last meeting of the Council the matter was again adjourned for a month.

The first annual report of the Newcastle Invalid Loan Society has been issued, from which we learn that this laudable society has been very successful, during the first year of its existence, in administering to the comfort of the necessitous poor, many articles of furniture for the use of invalids, clothing, and medical appliances having been lent out gratuitously during the year. The stores have been placed under the superintendence of Mrs. Price, of the Newcastle Industrial Dwellings, who exercises a constant supervision over the articles lent out. It is gratifying to learn that much good has been effected, and none of the articles lost.

WATER SUPPLY.

The Waterworks Committee of the Brighton Town council have approved plans for three additional reservoirs, to cost £14,000. Tenders are invited for the work.

Extensive works of water-supply, including the provision of covered reservoirs and the laying of 2,450 yards of cast-iron mains, are about to be carried out by the Nantwich rural sanitary authority, from plans by Mr. J. A. Davenport, their surveyor.

APPOINTMENTS UNDER THE PUBLIC HEALTH ACT.

MEDICAL OFFICERS OF HEALTH.

FISHER, THOMAS, M.R.C.S. Eng., L.S.A. Lond., has been appointed Medical Officer of Health for the Garstang Rural Sanitary District, at £50 for one year, *vice* Irvine, whose appointment has expired.

HILL, Philip Edward, M.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Crickhowell Rural Sanitary District, at £30 per annum.

MAILE, Charles Edmund Drayson, L.R.C.P.Edin., M.R.C.S.Eng., has been appointed Medical Officer of Health for the Westbury and Whorwellsdown Rural Sanitary District, Wiltshire, at £80 for one year, *vice* Ross, whose appointment has expired.

MCNEILL, John Patric, M.D., has been re-appointed Medical Officer of Health for the Tiverton Urban Sanitary District, at £40 for one year.

PARTRIDGE, Thomas, M.K.Q.C.P.Irel., M.R.C.P.Eng., has been re-appointed Medical Officer of Health for the Stroud Sanitary District at £90 for one year, for the Stroud Urban Sanitary District at £50 for one year, and for the Bisley Urban Sanitary District at £15 per annum.

THOMAS, William Hopkins, L.R.C.P.Edin., M.R.C.S.Eng., has been re-appointed Medical Officer of Health for the Maesteg Urban Sanitary District, Glamorganshire, at £20 for one year.

VAISEY, Thomas Frederick, M.R.C.S. Eng., has been appointed Medical Officer of Health for the Winslow Rural Sanitary District, Bucks., at £40 for one year, *vice* Collins, resigned.

VERITY, Abraham John, M.R.C.S. Eng., has been re-appointed Medical Officer of Health for the Bridgend Urban Sanitary District, at £25 for one year.

SURVEYORS, CLERKS TO GUARDIANS, INSPECTORS OF NUISANCES, ETC.

ADDIS, Mr. Henry Arthur, has been re-appointed Clerk to the Usk Local Board and Urban Sanitary Authority, at £20 per annum.

BARRETT, Mr. William Lewis, has been appointed Surveyor to the Sevenoaks Local Board and Urban Sanitary Authority, at £200 per annum with residence, *vice* Brumell, resigned.

BELLAMY, Mr. George D., has been appointed Surveyor to the Corporation and Urban Sanitary Authority of Plymouth, at £400 per annum, *vice* Alty, deceased.

BULLOCK, Mr. John, has been elected a Member of the Mexborough Local Board and Urban Sanitary Authority, *vice* Kirby, resigned.

CARDER, Mr. Eugène, has been appointed Clerk to the Dover Guardians and Rural Sanitary Authority at £130 per annum, and £80 per annum as Clerk to the Assessment Committee, £70 per annum as Clerk to the School Attendance Committee, and £10 per annum for conducting the elections, *vice* Carter, resigned.

CATTLE, Mr. G. S., has been appointed Clerk to the Malton Guardians and Rural Sanitary Authority; and Clerk to the Assessment and School Attendance Committees; and Returning Officer, at a total of £214 per annum, *vice* Walker, deceased.

CLAY, Mr. H., has been elected a Member of the Ilkeston Local Board and Urban Sanitary Authority, *vice* Hobson, resigned.

COLE, Mr. John, has been re-appointed Surveyor, Inspector of Nuisances, and Collector to the Ivybridge Local Board and Urban Sanitary Authority, Devonshire, at £60 for one year.

DOLBY, Mr. Thomas Robert, has been appointed Clerk to the Cannock Guardians and Rural Sanitary Authority, at £100 per annum, as Clerk to the Guardians; £30 per annum, as Clerk to the Rural Sanitary Authority; £40 per annum, as Clerk to the Assessment Committee; £25 per annum, as Clerk to the School Attendance Committee; and £10 per annum, for conducting the elections, *vice* Glover, resigned.

FANE, Mr. Henry G., has been appointed Treasurer to the East Retford Guardians and Rural Sanitary Authority, *vice* Lambert, resigned.

GIDNEY, Mr. Henry James, has been appointed Clerk to the Aylsham Guardians and Rural Sanitary Authority, Norfolk, *vice* Scott, deceased.

HAIGH, Mr. George, has been appointed Collector to the North Brierley Local Board and Urban Sanitary Authority, Yorkshire, at £100 per annum.

HAWES, Mr. Henry, has been appointed Head Inspector of Nuisances for the Brighton Urban Sanitary District, at £130 per annum, *vice* Clarke resigned.

HOLLAND, Mr. Wm. Henry, has been re-appointed Surveyor and Collector to the Cirencester Local Board and Urban Sanitary Authority, at £130 for one year.

SLADE, Mr. William Henry, has been re-appointed Collector to the Usk Local Board and Urban Sanitary Authority, at £10 per annum.

TRACY, Mr. P., has been elected a Member of the Tunbridge Wells Local Board and Urban Sanitary Authority, *vice* Oakley, resigned.

WAUGH, Mr. William, has been appointed Inspector of Nuisances for the Hebburn Urban Sanitary District, at £52 per annum, *vice* Ponder, resigned.

YEO, Mr. Isaac, has been re-appointed Surveyor and Inspector of Nuisances to the Okehampton Local Board and Urban Sanitary Authority, at £15 for one year.

NOTICES OF MEETINGS.

ASSOCIATION OF MUNICIPAL & SANITARY ENGINEERS AND SURVEYORS.

A MEETING of the Northern District members of this Association was held in the Corporation Committee Room, Sunderland, on the 22nd ult., under the presidency of Mr. A. M. Fowler, of Newcastle-on-Tyne. The Secretary read a paper by Mr. W. G. Laws, Borough Engineer, Newcastle, on 'Street Lighting of the Future', which, after reviewing the various methods of street lighting now being tried, showed the present relative cost of electric lighting and the most improved methods of gas lighting, from which it appeared that the great cost of an effective electric light precluded its general adoption at the present time. A somewhat lengthy discussion on the subject followed.

A paper was also read by Mr. James Hall, Borough Surveyor for Stockton, on 'Private Street Apportionments', which provoked a long discussion. Other papers were of necessity adjourned till the next meeting. During the day the members visited the cement works of Mr. Alexander Baird, the London and Hartlepool Creosote works, the South Docks, and the Hendon Gas Works; and were evidently much interested in all they saw. The meeting in the evening terminated with the customary vote of thanks.

A BILL TO PROVIDE FOR THE BETTER NOTIFICATION OF INFECTIOUS DISEASES.

As many of our readers may not have had an opportunity of seeing the draft of this Bill, we reproduce it, so as to give them an opportunity of considering its clauses.

Whereas it is desirable to provide for early notification to Sanitary Authorities of the occurrence of infectious diseases within their districts:

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows; (that is to say,)

1. This Act may be cited for all purposes as the Infectious Diseases Notification Act, 1882.

2. This Act shall be read and construed with the Public Health Act, 1875, 38 and 39 Vict., c. 55.

3. Any medical practitioner attending or requested to visit and attend any inmate of any building in the district of any Sanitary Authority suffering from small-pox, cholera, typhus, typhoid, scarlet, relapsing, or puerperal fever, diphtheria, measles, or erysipelas (or other acute infectious diseases, when included within the scope of this Act by order of the Local Government Board) shall immediately on becoming aware of the nature of the disease from which such inmate is suffering forthwith fill up, sign, and transmit, either personally or by post, to the office of the Sanitary Authority of the district a certificate in accordance with the form of notice contained in the schedule to this Act.

4. If no medical practitioner be attending on such inmate, then the occupier of such building, or if the occupier be incapacitated by illness, the person in charge of such inmate, shall, so soon as he becomes aware that any such inmate is suffering from any infectious disease, forthwith transmit a notice by post to the Sanitary Authority of the district, at their office, as nearly as possible in the form contained in the schedule to this Act.

5. The Sanitary Authority shall supply gratuitously to every registered medical practitioner resident or practising in the district, and to every inhabitant, upon application, forms for the certificate by such medical practitioner or inhabitant, as the case may be, of the occurrence of infectious disease; and the Sanitary Authority shall pay to every registered medical practitioner who shall, in accordance with this Act, transmit any such certificate a fee of *two shillings and sixpence* in respect of the same; provided that not more than one fee shall become payable to the same medical practitioner for any certificate given by him in respect of any infectious disease occurring in the same building within thirty days of the date of the said certificate: Provided also that no fees under this Act shall be payable for the notification of infectious diseases occurring in workhouses, gaols, or public hospitals.

6. Any person neglecting to transmit any notice required by this Act shall be liable to a penalty not exceeding *five pounds*, to be recovered in the same manner as penalties under the Public Health Act, 1875.

7. Every Sanitary Authority shall take means to make this enactment generally known by affixing notices of the contents thereof in all public places where such notices are usually affixed within the district of such Authority.

8. This Act shall not apply to Ireland.

SCHEDULE.

FORM OF NOTICE.

NOTIFICATION OF INFECTIOUS DISEASES ACT, 1882.

'I hereby certify and declare, in pursuance of the above-named Act, that living at No. Street, is suffering from infectious disease, viz., Dated the day of 188

Registered medical practitioner, or householder, or person in charge, as the case may be.

To the Sanitary Authority of the district of

NOTES AND QUERIES.

Having for some time back been in the receipt of Queries appertaining strictly to sanitary work, and which it would be easy to answer without having to refer our correspondent to competent professional advisers, we have opened a column in which to register such Queries and Replies thereto as can fairly be expected from us; and our subscribers and readers are invited to make such use of this column as will tend to benefit themselves and the community. Both Queries and Replies will, however, be subjected, if unnecessarily long, to a strict curtailment.

11. GROUND AIR.

I purpose putting a slow-combustion stove in the hall of my house, drawing air to feed the stove from under the floor, that is, simply making a hole in the floor to connect stove with air that passes beneath floor from outside gratings. Is there any objection, on sanitary grounds, to this arrangement? I mean by drawing up air from soil below floor. F. P. G.

[If the air is to feed the fire within the stove, there is no objection to the plan. Indeed, it has advantages, for it will, to some extent, prevent the air from the soil below coming up into the air space of the house, as it will more readily pass to the stove, and be consumed there. If, however, the air is merely to be warmed, and delivered into the house for breathing purposes, the plan is objectionable, as it is directly sucking air up from the most undesirable position. In such a case the air ought to be drawn from the outside, through a grating in the wall, and conveyed through a special tube to the stove.]

12. PORTABLE DISINFECTING CHAMBERS.

Will you kindly inform me where I can obtain prices and particulars of a portable disinfecting chamber, for disinfection by heat? M. O. H.

[Leoni, of the Adamas Works, St. Paul's Street, New North Road, London, makes a good portable disinfecting apparatus; as do also Maguire and Son, South Frederick Street, Dublin.]

13. Electric Light Companies and Roads.

In what position do electric-lighting companies stand with respect to their powers of opening roads to lay pipes? If to the many evils which Local Authorities have to deal with, owing to the destruction of roads by negligent water and gas companies, there is added another source of damage to roads in the shape of electric companies, life in towns will soon become well nigh unbearable. A. B.

[This question is not free from difficulty; the decisions of the Courts not being by any means consistent. On the one hand, it has been held that, without the express authority of Parliament, no company has a right to interfere with the King's Highway, even with the sanction of the Local Authority which manages the roads; whilst on the other hand, Courts have refused to restrain gas companies opening roads to lay pipes, on the ground that the inconvenience was only temporary and trivial. On the whole, but with some doubt, we incline to the opinion that an electric-light company would come within the latter class of decisions. Probably, however, an authoritative decision on the point will be obtainable ere long.]

14. Local Board Election.

Although the voting papers used at the last election are, as directed by the Act, open for the inspection of ratepayers, can a ratepayer overhaul and scrutinise every paper, taking notes how everyone voted; or can he occupy an unlimited time with his examination? B.

[This matter must be deemed to be in some measure within the discretion of the Clerk; he must give all reasonable facilities within 'office hours', but need not give unreasonable facilities.]

15. Power to close School during Epidemic.

The Medical Officer of Health, in his Report to our Local Board, has recommended the closing, for fourteen days, of one of the schools (which is under the control of the School Board) on account of an epidemic of measles. Can the Local Board compel the closing of this school for the term named; and if so, please give section of Act? J. T.

[No. The Local Board has no such powers; it may recommend the School Managers to close the school, and there its powers end.]

16. Dual Appointments.

I am Medical Officer of Health to a Rural Sanitary Authority, and the Sanitary Inspectorship (or Inspectorship of Nuisances) has been held by a civil engineer (who held a Government appointment in Ceylon before this, and who is a 'gentleman'). He is about to retire, and my impression is that by clause 191 (2nd and 3rd paragraphs), ch. 55, of the Public Health Act, a Medical Officer of Health is not precluded from holding both appointments. If so, inasmuch as I have been already doing a good deal of the work of the Inspector, and have retired from private practice, my intention is to apply for the appointment, but before sending in my application, I am anxious to obtain your opinion as to whether I am 'regular' in doing so. There can be nothing *infra dig.* in the work itself, or the Local Government Board would not impose a good deal of the same kind of work on the Public Health Officer. The question is, whether there are any precedents for the two appointments being held by the same person, and whether I should be acting unprofessionally in taking the appointment, or in applying for it?

M. O. H.

[Although there is no statutory prohibition of a medical man holding the appointment of Inspector of Nuisances, the Local Government Board have invariably set their faces against it, and, if the appointment which you seek is subject to their sanction, they will certainly refuse to assent to your nomination. The work of an Inspector of Nuisances is work that a medical man can scarcely perform without losing caste, and we should recommend you not to apply for it.]

17. Pan Closets.

Can you give me any idea as to what becomes of the universally condemned pan-closets after they have been removed from a house?

Querist.

[This is a question which we, ourselves, have very often asked, and the result of the information imparted to us from divers persons is to the effect that only in some cases are these old contrivances completely broken up, and rendered unfit for further use. Sanitary contractors of any standing never furbish up these things again, but utterly destroy them, and send the old wrought iron and brass-work to the founders, for which they receive a few shillings in exchange. We know of firms, accustomed to carrying out sanitary work, who nevertheless dispose of the removed pan-closets to people who are regularly in the habit of burning out the containers, fitting the basins up with new pans, lacquering again the brass-work, cleaning up and re-blacking the whole to look like new, and selling them again to those who choose to purchase them. We are told that these old closets, just as removed, will fetch about ten shillings apiece, as against the half-crown or so as old material. As a matter of fact, the life of a pan-closet exceeds that of a cat; the container is always to the good, and so is the lever, whilst the basin can be changed at will for a very trifle, as can also the pan. It is a matter of gratification to us to know that there are some sanitary firms who scout with indignation the re-selling of these objectionable kinds of apparatus, and we know several engineers who insist upon so maiming a closet of this kind that it would be much cheaper to buy a new one than to fit it up again. We may take it for granted that in a house having five closets three of them will be pan-closets, except in houses of very modern build, and the number of these closets, therefore, to be tinkered up each year in the interests of the builder, we may perhaps say, removed in the interests of the occupant, and done up again in the interests of the old salesmen, and to the detriment of persons inhabiting jerry buildings, is something shocking to contemplate. We cannot think for a moment, being, as we are, in possession of sound and good flushing closets, that anyone would willingly perpetuate a reign of pan-closets, with their huge containers and D-traps. We are well aware that many improved pan-closets are in the market, and no one could have perambulated the South Kensington annexes during the International Medical and Sanitary Exhibition without having come in contact with several of these closets of the pan order, where the risk to health is fairly minimised by the enamelling of the iron container, by the introduction of earthenware, and the like. Our strictures do not refer to these improved patterns, but to the cheapest order of closets of this build.]

18. Drain Tests.

1. What are the best practical modes of applying the smoke or odour tests to drains?
2. An exhaust ventilating shaft being provided at the termination of a length of sewer, can you give me any formula for determining—approximately—its relative effect on inlets at varying distances?

Sciolist.

[1. Every engineer has his own system of applying odour tests to drains, and his chief reason for making use of them is when drains already laid down are supposed to be faulty, particularly at the upper portion of the drain-pipe. Supposing that the drain-pipe traversed, in the open, a floor which was covered by joists and flooring, the introduction, near the outfall, of fired brown paper, which does not readily burn, would speedily enable the operator to diagnose where a fault lay, as, for the matter of that, would also peppermint or ether. The same would hold good in upright soil-pipes, etc., as the presence of a leak in these would be speedily detected by these means. In testing the underground drain, the upright pipes should be stopped off, and any fault would speedily reveal itself. The smoke test, however, is chiefly used in order to ascertain whether the drain ventilates itself freely to the top of the ventilating pipes, and for this purpose the smoke producing material is introduced generally in an opening made in the drain, near the outfall, in the front area. Of course, in laying down new pipes surrounded by concrete no such test is needful.]

[2. Our querist is, we trust, aware that none of the air-current meters now in commerce are so far reliable as to yield any very reliable data, and the Sanitary Institute of Great Britain have expended some £200 in proving this in their experiments at Kew during the last two years. The formulæ, therefore, hitherto given in scientific works cannot be considered altogether satisfactory, although approximately near. Our querist must content himself with the formulæ given in text-books, and scattered throughout the publications of the Institution of Civil Engineers and kindred societies.]

19. Cost of Cremation.

Can you inform me what would be the cost of cremating a body in England, provided it were allowable, and tell me the reason why the cremation of the body of an Englishman in Milan, as shown during the trial in the Chancery Division in London on the 8th of March last, showed the expenses to amount to the large sum of £321. Anxious.

[We have referred this question to Mr. Eassie, and he states that the cost for fuel for cremating a body in the crematory belonging to the Cremation Society of England, erected near Woking, would not exceed ten shillings, and that the charge for the use of the crematory, and the attendance at the rite, would not likely exceed five pounds. The crematory is not yet in use, although no law forbidding cremation exists in England. In the matter referred to by 'Anxious,' the cost of the cremation of the said body at Milan is roughly divisable as under:—Disinterment, lead coffin, as required by the Italian Government, declaration in England, Consulate verifications, concurrent expenses, etc., £35; freight of body to Genoa, customs, dock dues, and shipping charges, £30; special carriage to Milan from Genoa, and necessary assistance, £15; fee to Italian Government for the introduction of the body, etc., £16; cost of special attendant in charge of the body from London, time, fare, and expenses, £86; translations, copying, and other fees, and telegrams, £13; expenses of cremation, bearse, porters, etc., £8; export tax of the body, charged by the Italian Government, and consequent expenses, £20; hotel expenses of English attendant upon the body during twenty-two days, £25; engineer's fee, London to Milan, time, travelling, and all other expenses, £35; sundry collected expenses, £14. The balance, £24, was for law expenses, preparing for the law-suit. It will be seen by the foregoing that the actual expenses of the cremation proper were some £8, which is about the correct sum. All the other expenses were consequent upon exhumation, freight, attendance, and Government fees for import of body and export of the ashes. In other places where cremation is practised, as, for instance, at Gotha, a cremation costs about the same, or somewhat less. It is a great disgrace to our country that cremation can only be achieved abroad at such a cost, and that the wife of a Rajah, who lately died in London, could not be accommodated with fire-burial in the Imperial country. Cremation is making immense strides in our midst, and something must shortly be done to satisfy this sanitary proclivity of the people.]

20. Average Mortality of England and Wales.

May I trouble you to give me the average mortality of England and Wales during the last year, and also the zymotic average for the same period. J. H.

[According to the Registrar-General's Quarterly Return for the last three months of 1881, it appears that the mean rate of mortality in England and Wales during last year was so low as 18·9 per 1000, and lower than in any previous year on record. The rate from the principal zymotic diseases was also exceptionally low, namely, 2·24 per 1000.]

ORIGINAL PAPERS.

SANITARY NOTES.

By J. Lane Notter, B.A., M.B.,
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Air.

It cannot be considered a startling statement if we affirm that in the whole range of Sanitary Science there is no subject which more earnestly demands our attention than the air we breathe, and for this simple reason, that no matter in what condition we find it, we are obliged of necessity to inhale it; and although impurities in air are soon eliminated by the ordinary processes of Nature, namely, by diffusion and dilution, and subsequent oxidation, still it must be remembered that our power of detecting bad air is very limited, for there is no sense more quickly dulled to differentiate degrees of impurity than that of smell, and certainly if it is, perchance, exposed to a noxious atmosphere for a short time, so quickly deadened are its powers of perception, that we are unable to place the smallest dependence on it. Further on, we shall have again to refer to this matter, and consider what value we can possibly assign to it.

In the majority of houses, even of the better class, which are well constructed, impure air is the rule. We find all other rules for convenience and utility are strictly attended to, but how to carry off the products of respiration, as well as those of combustion, and at the same time to supply a sufficient quantity of pure air, is never once thought of, although of such vital importance; and here we may remark that the cause for all this is to be found in the want of knowledge which so generally exists on this subject. Either this knowledge has been withheld, or perhaps, what is more probable, the public mind has not been educated sufficiently on this subject. Late years have seen very much accomplished in setting a proper value on water-supply and drainage, but the same advance has not been made as regards air and ventilation, and this latter science is now struggling against fearful odds and prejudices for an existence.

It is no uncommon thing to see houses and apartments fastened close, every chink and crevice through which air can enter being carefully sealed down, the products of combustion of gas and candles, of fire and lamps, unthought of; pure air for respiration for ourselves and others uncared for; and this state of things allowed to exist for no inconsiderable portion of the day. Nor is this all. The amount of cubic space and superficial area, per head, banished as worth not even a thought, and having no reference to individuals, while too often we may add to this list, impurities in the form of sewer-gas, most dangerous in their character, are allowed to permeate by useless traps and unventilated soil-pipes, having direct communication between the sewers and the dwelling-house, often brought into the very rooms which, as a rule, are worst ventilated, and where they run the greatest chance of doing the largest amount of mischief. It may safely be stated that overcrowding and dust, or we may call it filth in its most delicate form, and indistinguishable shapes which float through the air, and sewer-gas, are too often inspired, only to propagate disease at the expense of the unfortunate victim.

Modern investigators affirm, and certainly with much truth, that the chief factor in producing specific disease consists in a very minute solid particle, and that it is by means of this solid atom disease is propagated. Still, while admitting this, we are perhaps limiting contagium too much, and in the present state of our knowledge, it would perhaps be as well to guard against the possible presence of gaseous poisons, these latter being derived from the morbific products of the nutritive processes of minute organisms, and are extremely diffusible. The germs of disease are so minute, and their specific gravity so low, that they can easily be carried up into the air by the watery particles always present in the atmosphere, and the diseases of which they are only the seeds sown broadcast through a community.

Each year that passes tells more plainly that pure air is equally an essential to health as pure water, and if we are to combat disease and death with weapons which have any power, we must use these chiefly, and pin our faith almost entirely on 'pure air, pure water, and pure soil'. In connection with this, the experiments of Professor Tyndall and Dr. Roberts, of Manchester, among many others, are extremely interesting. They have shown beyond all doubt of contradiction the power of an infective atmosphere to propagate changes where filtered air was harmless; for not only will ordinary air set up fermentative changes in organic liquids, developing germs and growths which find in these a congenial soil, and propagating themselves almost indefinitely, exemplifying, in no ordinary manner, the need necessary to render our atmosphere usable.

When the sun shines into a room through a crevice or slit, anyone can observe the atmosphere of dust it reveals, and the same effect is produced by the electric beam. So thickly scattered through the air of rooms is this fine dust, that we are almost at a loss to understand how we are able to breathe with any comparative degree of freedom, and this will at once furnish abundant reason why the air in our dwellings should be diluted, and a regular channel of intercourse kept up between the inside and outside air, so as to help to free the air within of its noxious impurities by dilution and diffusion, and, as occasion may offer, frequently changing the entire air of our dwellings by opening the windows and exposing, as far as possible, the rooms to the full effect of the wind, thus assisting, as far as we have it in our power, to rid habitations of a tainted or suspicious atmosphere. The normal condition of a fair sample of external air consists of:—

Oxygen	20.96	volumes per cent.
Nitrogen	79.00	,, ,, ,,
Carbonic Acid	0.04	,, ,, ,,

In the open country, and particularly in mountain districts, the oxygen is 20.99 or nearly 21 volumes per cent., and the carbonic acid is not more than 0.03 volumes per cent. As might be expected, the sea-shore and open spaces command the largest amount of oxygen, and as we advance inland, especially near towns and districts largely populated, the oxygen decreases to a considerable extent. Take, as an example of this deterioration, the crowded parts of Glasgow, where we have only 20.889, and in the open spaces 20.929, or a total average of 20.909 of oxygen, or to state this in other words, we find that, in places where putrefying matter exists, we have a smaller amount of oxygen in the air. The effect of such a loss in itself may not be material,

but it certainly diminishes to a large extent the power of the air to limit putrefactive causes. Pure mountain air may be said to have a normal oxidising power, and if a portion of its oxygen is taken from it, it will require no close reasoning to understand that it loses one of its most essential constituents, though what the effect of merely reducing the oxygen to a small extent is on the health of the individual, is not quite certain. As far as we can judge at present, its effects would appear to be more on bodies external to the individual, such as offensive sewers and manure heaps, with their resultant bad odours from decomposition taking place; in short, from refuse and filth of all sorts, which exist wherever animal life is. The absence of oxygen is also an evidence of injurious matter in the air itself, for coincident with it, we nearly always find an increase of carbonic acid, and possibly the presence of other gases.

It may with safety be affirmed that the decrease of oxygen is an indication of impurity of some sort existing in the air, although noting exactly such diminution is not of much practical use, as there is some difficulty in estimating this gas, and the results are unsatisfactory, whereas by calculating the percentage of carbonic acid present, an experiment extremely simple and trustworthy, we at once obtain an index of the purity of the air. From Dr. Angus Smith's experiments, we find that whenever the oxygen is reduced to 20.750 per cent., the air becomes exceedingly oppressive.

Nitrogen is the second gas which forms the largest part of the air. It is one of the least important of the elements, and its chief characteristics may be summed up in a very few words. It is devoid of colour, taste, and smell; it does not support life, and is thought to be present as a mere dilutant of the oxygen; this latter being one of the most energetic of gases, the nitrogen goes far, no doubt, to moderate its influence on human beings. This gas enters largely into the composition of the gases emanating from sewage, and which are found to be wholly deficient in oxygen, while the presence of nitrogen not unfrequently equals 10 per cent. The next constituent of air we have to consider is carbonic acid, and to the sanitarian and householder this is by far the most important, for the following reasons:—1. It is an indirect measure of the impurity in air; 2. It increases *pari passu* with the impurity; 3. Its estimation is extremely simple; 4. The results are fairly uniform and satisfactory; 5. Every householder can perform a qualitative experiment, yielding fairly good results in the majority of cases. When we enquire into the origin of this gas in our atmosphere, we learn that carbonic acid is evolved in the processes of respiration and transpiration, in combustion of coal and other vegetable carbonised material; in putrefaction and decay from the soil also; and in various manufactories. It is also exhaled from volcanic and other intra-terrestrial forces. Such are some few of the sources of this gas to be found in nature. It must be here noted that the presence of this gas alone does not appear to be injurious, unless the amount be very great. Of this fact we have ample proof in the large quantity, comparatively speaking, present in soda-water manufactories and breweries. It must be borne in mind, that in dwellings and inhabited places, carbonic acid, beyond a certain known quantity, is never found alone; associated with it, and increasing in proportion to the quantity of this gas, is what is known as fætid organic matters, derived from exhalations from organic sources, and it is these which are especially dangerous. We find under such circumstances that the diminished oxygen is replaced, not only by carbonic acid, but by gases of animal origin; and it is as a measure of these latter that we require to estimate the amount of carbonic acid present in the air. As Dr. Angus Smith well remarks, 'we must not neglect the carbonic acid; on the contrary, it ought to be examined minutely, so that not the smallest increase be allowed if possible; not that we know of any positive evil which it can do of itself in these small quantities, but because it almost always comes in bad company.'

The normal amount of carbonic acid in pure air is .03 per cent., and in towns about .04 per cent. From a large number of experiments and close investigation, the late Professor Parkes laid it down as a rule, that the impurity to be added for respiration and lights, etc., should not exceed .02 per cent. This would make a total impurity in inhabited places of .06 per cent. In a room the warm air rises, and as a result, near the ceiling and upper parts of the room the worst air is to be found. An exception to this rule is where lofty churches and theatres are without ventilators. The extreme height allows the air to cool, and then, being heavier than the original air, on account of its humidity and impurity, it falls. The following, taken from Dr. Angus Smith's work, will show the relative amount of carbonic acid which was present in Manchester, and gives a fair example of the change this gas undergoes in quantity under the varying conditions of city life.

Usual weather	0.0403
During fogs	0.0679
About middens (of which there are 1,000 in Manchester)	0.0774
Mean of carbonic acid in London streets	0.0380

We have now drawn the attention of our readers to the various sources of carbonic acid as it exists in our atmosphere; there are, on the other hand, most fortunately, causes of diminution of this gas, which are so constantly at work, and with the best possible results. These consist mainly in the decomposition of carbonic acid. By this process the carbon is reduced and the oxygen regenerated; and this is effected by the action of living plants on air containing carbonic acid; in the presence of sunlight, vegetation therefore becomes the great primary agent at work, in nature, which restores the equilibrium of the atmosphere, and keeps the carbonic acid within limits which are fixed and definite. It will be readily understood, from what we have already said, that in estimating the impurities in air, the presence of carbonic acid over .04 per cent. must for our purpose be considered injurious; though in making this statement we must be understood to regard this gas more as an index of impurity, rather than being positively injurious itself, when present in such small quantities. In discussing this question, it must be remembered that every moment of time there is a continual circulation going on in the atmosphere. Air is never in a constant state, but is subject to the same law or principle which pervades all nature, and is, perhaps, more subject to external influences than anything else. The carbon is constantly undergoing change. Men and animals breathe and transpire the wasted tissues of their bodies in the form of carbonic acid; and this latter, in its turn, goes to the growth and sustenance of the whole vegetable world, and in due course of time it returns to us the oxygen to unite with the carbon used up by our systems, and so the cycle of existence

goes on, the animal depending on the vegetable kingdom, and this latter again on the animal for its nutriment and growth.

Another impurity we meet with is ammonia, and although we are aware that it is a noxious product, we have very little experimental data connected with it. We find it present in air, otherwise pure; the actual quantity is increased after heavy rains, in fact, wherever nascent hydrogen can be evolved, as over drains and cesspools, it nearly always unites with atmospheric nitrogen to form ammonia. Over graveyards it is very abundant, and the air close to gasworks is seldom to be found without traces of it; in this latter case it is no doubt a product of the combustion of coal. Unless in considerable quantities, we can safely say that it must not be considered an impurity, for it is one of the sources from which plants obtain the nitrogen they require for the seed, though this latter is disputed by many good authorities; and we may state that it is still undetermined whether plants can assimilate the free nitrogen which exists in the atmosphere. Of the solid impurities existing in the atmosphere, we may, for convenience sake, consider them under two heads, namely, the organic, and the inorganic.

Of these, the organic are the more frequent, and by far the most dangerous. By shifting wind, and the varying currents of air, enormous quantities of organic matter are carried. This fact is borne out experimentally by the investigations of Mr. Tichborne, in Dublin. He demonstrated the fact that for several hundred feet above the level of the street, straw, hay, litter, manure, and street sweepings were carried, and so also, no doubt, those minute organisms which are the carriers of infection, if they are not the absolute contagium themselves. These solid particles, fastening on the soils congenial to them, spread themselves rapidly, and their growth and development are soon told in the high mortality which occurs. The distance (nearly 600 miles) to which vast quantities of sand are blown on to the decks of vessels in the tropics is an evidence of the power wind has to carry particles with it. Epithelial scales from the skin, pus, and other excreta which dry rapidly if exposed to a hot sun, are no doubt present in the atmosphere of dirty and unventilated places. Pus cells and fat crystals are no uncommon objects to find in some hospitals, and this accounts for the prevalence of erysipelas and blood-poisoning in some parts of a building set apart for sick people, while other portions remain free, and where the disease ceased when proper hygienic measures were observed. These suspended organic matters are always to be guarded against; the pus cells in an hospital ward, floating through the air may attack some cut or wound, and set up inflammatory action in it; or the cause of specific disease, whatever it may be (and at present we are certainly in the dark concerning it), may no doubt enter the blood through the lungs. We see many instances where inflammation of the eyes is propagated in ill-ventilated schools and workhouses from a like cause, and mechanical irritation has been set up in the process of many trades and manufactories which has caused extensive lung disease to develop; as an instance, we may cite the fact that stone-cutters suffer one-third more from sickness than carpenters; steel-grinders suffer still more severely from the entrance of fine particles into their lungs; and many other trades in like manner.

Though of less importance, the inorganic solids suspended in the air are not to be thought lightly of, as they are often extremely injurious; nevertheless we are apt to pass them by because they are less insidious, and therefore less interesting. From what has been stated it is evident that in dealing with the question of the sources of impurity we have a large field to travel over, and while we attribute many diseases to the mechanical irritation caused by the suspended mineral or inorganic matter in the air, we must consider further in detail those which are most common, affecting masses of the people, and which are derived from the organic world. Decomposing animal or vegetable matter, being a suitable soil for a specific germ or spore, is perhaps the most frequent source of impure air; among others may be mentioned the decomposition of organised structures, giving off organic vapours; the respirations, cutaneous and respiratory of men and animals; the effluvia from numberless excretions, the organic vapour which, although undetermined as to its nature, is the most potent principle for evil in the respired air. The products of decomposition of organic matter, such as light, carburetted hydrogen, sulphuretted hydrogen (the product of organic matter containing sulphur) are a few out of the multitude of sources of impurity. Again, we have the products of the combustion of coal and wood, of candles, oil, and gas, pouring into the air sulphide of ammonium, sulphurous acid, and carbonic disulphide. Of all impurities, that which appears to be the most insidious and most hurtful, is sewer air, the product of decomposition of sewer water, namely, fœtid organic matters, and sulphuretted hydrogen, etc.; this latter being formed from organic matter containing sulphur. Sewer air itself, as anyone can easily understand, has no constant composition, and little heed need be paid to the presence of gases, as they are the result of the organic filth undergoing change; and with this latter are believed to be connected those particles which produce specific disease, although we are utterly at a loss to isolate each one separately. When considering the sources of impurity in air, we referred to some which were due to trades, and to those may be added certain manufactories, such as cement works, brick-fields, lime-kilns, organic vapours from bone-burners, blood-boilers, soap-melters, and certain mineral poisons, as zinc and arsenical fumes from brass and copper workers. In the country there are far fewer sources of impurities existing; perhaps the principal one—if we dismiss trade factories—is the air derived from marshes. Marsh air contains an excess of organic matter, probably of vegetable origin, an excess of carbonic acid and watery vapour; carburetted hydrogen and sulphuretted hydrogen is also present, but it is not a constant factor. The air of these soils certainly develops a miasm, which is commonly known under the name of malaria, and which appears to be the product of decomposition of vegetable matter under conditions of high temperatures, associated with an excess of moisture.

Peaty soils appear to form an exception to this rule, partly because their antiseptic properties are supposed to prevent the decomposition of the organic matter, and thus to limit the spread of malaria. Whether this be the case or not, it is worthy of note that in Ireland, where peat marshes exist to a great extent, there does not appear to be the least tendency to malarious disease. In towns, many other conditions are present which tend to render the air less pure; masses of people are congregated within a limited area, vitiating the air by respiration and other factors resulting from the crowding together of masses of human beings; combustion of coal and gas; the effluvia from sewers and trades; from the soil, often

sodden with filth, undrained, and saturated with the poison of coal, gas, and sewer-air, which find their way through badly-jointed or broken pipes, and permeate the ground for no inconsiderable distance all around; the presence of middens and ash-pits in back yards, which are often close and unventilated, built in close and confined nooks, so as, if possible, to escape every gust of wind that may perchance come to dilute the impurity and scatter it. Such are a few, and only very few, of the conditions which tend to make the air of towns impure. But besides all these, there is also present in the air of most crowded places a nitrogenous substance, which increases according to the density of the population, and the conditions necessary to produce an infected atmosphere.

(To be continued.)

ON SOME ANOMALIES IN THE ADMINISTRATION OF THE SANITARY LAWS.

By E. B. Ellice-Clark, Assoc. M. Inst. C.E.*

Thirty years' experience of what were practically novel laws for England and Englishmen, has demonstrated the fact that the public in the aggregate take but slight interest in the administration of the sanitary laws—an apathy in itself so remarkable as to call for enquiry and discussion. In the selection of local representatives, where the election is made by voting papers delivered at the house of the voter, a very high percentage of such papers are never filled in at all, and a large quantity only partially so. In selection by polling—where some of the rough excitement of a Parliamentary contest is thrown into the election, a little interest, if not enthusiasm, is exhibited; but curiously enough, not in the qualifications of the candidate to fill an office exclusively municipal and sanitary, but in the fact of his being attached to this or that section of politics—to such an extent has the mischievous practice grown that the political party to which the selected and rejected candidates belong has become a regular item in the newspaper reports of Municipal Elections, and the letters C. or L. are bracketed after the names of the New Mayors as though they formed an essential part of the official title. Why this want of interest on the one part and misdirected interest on the other are shewn it is difficult to understand, and admits but of one interpretation, viz., ignorance of its importance.

There is no question in which the public are so vitally concerned as the administration of the public hygiene laws, inasmuch as they affect all classes alike, financially, physically, and morally. Any demonstration which attracts the attention of the public to sanitary matters is therefore of great value. Amongst the anomalies in the administration of these laws, is the varying number of members to each district. Newtown Heath, with a rateable value of £80,000, has only 9 representatives. Crediton, with a rateable value of £9,900 has 31 members. The local circumstances of these towns cannot differ so materially as to require such a difference in representation. From sixteen years' experience in various parts of the country, the writer is of opinion that one representative to every 3,000 inhabitants is plenty, with a minimum of seven, and a maximum of forty members, the latter adequate in itself to govern any town in Great Britain but the Metropolis. A large number of members always impairs the business capacity of a committee, though every class in every ward should be represented.

The area of elections is again anomalous; in many towns where the municipal area is undivided, at each election every voter exercises his influence over the whole town, instead of confining it to the particular quarter in which he resides—consequently we see one class and one interest only governing a town. The division of all sanitary areas into wards is so practical and just, that it should form the subject of a clause in the next Public Health Bill.

The class of members is an important factor in the success or otherwise of the sanitary laws; in the large towns, doubtless, candidates with the necessary qualifications are attracted, though it cannot be denied that often the reverse is the case. A noticeable feature is the almost entire absence of the medical profession. Brighton, with fifty councillors, has not a single medical man on the Board. Of all the learned professions whose members would be of the highest value to a Sanitary Board, the medical is conspicuous by its absence. It is therefore desirable to attract, if possible, members of this profession. If, therefore, municipal electors would look more to the special qualification of candidates than to their party politics, and the numbers of the members were limited, greater efficiency and economy would result to ratepayers.

The assimilation of the Sanitary Laws is much needed. Boroughs with Quarter Sessions are exempt from the operations of the Highways Act, 1875, may appoint their own auditors, and do a variety of things which Local Board districts may not. While the Public Health Act contemplated uniform laws for all towns, its provision for making bye laws and permissive character have produced quite the contrary result. Not only are the laws of adjoining districts different, but in the same area two separate Sanitary Authorities administer the law. In Local Board districts the Poor Law Authorities are armed with sanitary powers, distinct, yet clashing with the powers of the Sanitary Authority. Two sets of officers go over the same ground, two legally constituted bodies exercise their powers in dealing with epidemics in the same area; both have power to isolate disease. Such a conflict of authority can have but one result—that of impairing the Acts they administer.

Further, we find an authority, created for the special purpose of relieving the poor, having cast on it the administration of the Sanitary Acts—a duty which it is clearly unable to perform in a satisfactory manner, more especially since the introduction of complicated regulations for new buildings. Is not the relief of the poor a question itself of sufficient importance to demand a separate authority? For by what process of reasoning are linked together such questions as out-door relief and the disposal of sewage?

The areas of numerous Rural Sanitary Authorities contain large towns requiring urban supervision, the Union Authority is cumbersome, inconvenient, and unsuited to their requirements, while the multiplication of separate authorities would be equally so; a redistribution of areas is necessary in such cases. County or Watershed Boards appear to offer the most practicable machinery for giving effect to Rural Sanitary Legislation. Of the division of great towns into separate authorities, the writer must speak with caution at a Brighton Congress; but putting aside

* Read at the Brighton Health Congress, December 1881.

local prejudices, the subdivision of a great town into districts has considerable advantages. Paris is so dealt with, though under one chief. Nearly every great town in the kingdom is so divided—there may be cited Liverpool, Bootle, and West Derby, Manchester and Salford, Plymouth and Devonport, with many others, in addition to Brighton and Hove. Whatever theoretical disadvantages this dual government possesses, it has this one practical advantage which must not be lost sight of—that it brings about competition. A standard of sanitary efficiency is set up at a standard cost; without a subdivision of authorities, there is not such a standard of efficiency at a given cost.

Amongst the most important functions of a sanitary authority is the control of new streets and buildings. It may be here remarked *en passant* that a grave defect of the Sanitary Acts is the non-interference with existing buildings. Remembering that the very nature of old streets and buildings was the primary cause of sanitary legislation, it would seem temporising with the case not to deal with streets and buildings where sanitary evils exist. Property has justly great rights; but property has justly great obligations. To cite an example showing the deficiency of the Public Health Act. Any house erected previous to the adoption of the Act by the Local Authority may be enlarged, or dealt with in such a manner as its owner wishes—it may be rebuilt with every sanitary defect, except bad drainage, perpetuated—there may be rooms of any height—without any ventilation, walls of any thickness, every inch of area within the curtilage may be covered—in short, all those evils for which bye-laws are made may remain, and worse still, may be exaggerated and intensified, for there is no difficulty in so rebuilding a house as to place it outside the pale of the Act of 1875. Supposing that the application of every clause of the Building Bye-Laws would entail great hardship and deteriorate the value of property, is it not practicable to deal with the cardinal point of sanitation—rooms to be of a minimum height, walls of a standard thickness, air space of a minimum area, where such area was previously not built on, water-closets or privies to be erected next to an external wall, and have external ventilation.

Respecting laws to control new streets, putting aside for one moment the anomalies existing in the requirements of different localities, a most important omission is the inability to control the direction of streets. Convenience is of as great importance as construction, yet a property owner may so lay out new streets as to render inconvenient for all time streets which in a few years pass into highways, usable and repairable by the public purse, entailing great sacrifice in carriage of burdens on succeeding generations. Few towns show this in relief to the extent of Brighton and Hove, where new streets from east to west have become an absolute necessity. These might have been arranged with immediate advantage to landowners, and perpetual positive convenience to the public, at little or no cost. They can now be only attained by sacrificing property, at great cost to the public rates. If the public are to bear the burden of maintaining in perpetuity any road, they have a right to determine its direction.

The requirements of Sanitary Laws as to the minimum width of streets in Liverpool and the Metropolis is 20 feet; in Brighton 40 feet; many towns in Lancashire and Yorkshire insist on streets back and front, 35 feet as a minimum for front streets, 20 feet for back streets. What physical or other reasons exist for these variations? On the question of Mews, which may be any length and contain any number of human habitations, both the statute and all bye-laws are silent. In practice we find them constructed on the old lines 'of each to his own choice.' Under the latest edition of the Model Bye-Laws there are erected Mews of great length, unrestricted in width with dense populations, residing at the double disadvantage of living over stables surrounded with manure heaps in confined streets. If for the purpose of preventing overcrowding any area in a town it is essential to have streets 40 feet in width, when houses are free from the insanitary contamination of stables, it would appear doubly necessary to give houses so situated an equally large breathing area in front. Not only is the construction of such places insanitary, but positively unjust. If an owner of property proposes to construct houses without stables he must give a large area for street purposes; if he makes provision for both man and beast, then his own will is law, and he may crowd double the number of human habitations on a given area. A statute law enforcing a minimum width of front street when human habitations are erected is necessary.

The sanitary supervision of new dwellings is a matter which requires much consideration and detailed labour before it can be effectual. Of all the various privileges interfered with by the Sanitary Acts none strike so directly as the sections which relate to this subject. But, wide as their scope appears to be, and detailed as are provisions of modern bye-laws, they are insufficient to effect the object intended. The first question arising on the 157th section of the Act of 1875, which empowers local authorities to make bye-laws, is whether or not this section should be swept away and replaced by a Building Act, as in the Metropolis, so that sanitary law would be Imperial instead of local. A great disadvantage possessed by bye-laws is the difference existing between them in the same neighbourhood. In one town of 4,000 inhabitants, within the writer's knowledge there are four distinct sets of bye-laws for new streets and buildings, administered by the same executive. Within two miles of these buildings there are three separate and distinct sets of bye-laws, with this anomaly, that in the rural districts the bye-laws are more exacting, and presumably more effective. In the Lancashire and Yorkshire districts the bye-laws of various authorities clash to such an extent that architects have to become acquainted with as many as 12 different kinds of laws relating to buildings, many of them in contiguous districts varying essentially in their requirements. This is the result of the permissive nature of the Act and the elastic wording of the section.

While local, physical, and other conditions prohibit practically identical provisions for all works of construction, there are some main features to which a general statute law could be applied; amongst others, the thickness of walls, which now vary so much, that at Hanley party walls may be 4½ inches in thickness, at Ramsgate there are no restrictions, in Aldrington they must be thicker than required by the Brighton bye-laws. With reference to the sufficiency of air space about buildings, the laws are equally at variance. In the Metropolis an area of 100 square feet is considered sufficient for any house; in Hove every two-storied building must have width across of 15 feet; in Brighton, 10 feet. In many towns no provision whatever is made as to the area, beyond stating it must be sufficient; insufficiency being de-

cided by the local authority. As to the drainage of buildings, again diversity of law has produced conflicting systems, bewildering even to experts. It would not be difficult to frame a statute law for (*a*) the width of street, (*b*) structure of walls, (*c*) sufficiency of air space, (*d*) drainage of buildings; and other matters might be left to be dealt with under bye-laws, remembering always that such bye-laws should be as similar as is possibly practicable, allowing for the different physical conditions, and nothing further. No sanitary requirements that the necessities of the case demand should be omitted because of the value of the land, building materials, or the the social position of the inhabitants.

But while this change from bye-laws to statute-laws may take years, new streets and buildings are growing with giant strides. In the Local Board district of West Ham 200 a month are completed; a public statement was recently made that the Tottenham Board had passed plans for 5,000 houses in one year. To imagine that all these houses are built in accordance with sanitary lights, even if the strictest bye-laws are in force, is a delusion that the public should have exposed as soon as possible. Mr. Lewis Angell, the Surveyor of West Ham, in a recent paper says 'probably hundreds of thousands of houses are annually put together, we cannot say built, in such a manner as to be dangerous to the lives of the occupants. Not only is stability disregarded, but every essential principle of sanitation ignored. This result is as much due to ignorance as to carelessness. In too many instances it is also the result of the most wilful and wicked cupidity.' Here is a public statement by an official of thirty years' practical experience. He makes no blush at telling the public that it is impossible for him and his staff to exercise anything like the most elemental supervision required; that this is generally the case throughout the kingdom is unquestionable. Sanitary authorities may not confess it in public; but those who see what is daily going on know that the most insanitary evils are being perpetuated, and modern speculative builders are forging a rod for the backs of our immediate descendants, which must kill its thousands and tens of thousands.

You will ask, as members of that public having to live in these houses—But what are the Sanitary authorities doing? Is sanitary legislation a sham, and for what purpose have we a highly paid official, whose duty it is to see the bye-laws for new streets carried into operation? These are questions which naturally force themselves from the lips of the uninitiated. Let us look for an answer. The Local Government Board have recently issued a set of bye-laws to be observed in the construction of buildings. Now, without entering into the details of those bye-laws here, it may be broadly stated that, carried out in a liberal spirit, they would work an immense amount of good; they would put a stop to the erection of houses that are the veriest wigwams and more insanitary than the huts of the Kaffir. But how are they to be administered? Take the case of West Ham, with its 2,300 new houses a year. To execute the model bye-laws, there are fifty-two pages of closely printed matter, contained in 99 bye-laws to be observed, enough and to spare for any surveyor to have at his finger ends, and yet under these a house may be built without doors, floors, or windows, or restrictions as to the height of rooms, nor is there one word about plumbing. When the building surveyor enters the carcase of the house there are more than one hundred and thirty distinct provisions that the builder must have observed.

Let us pause here before we proceed to discuss the other works necessary to make a house fit for occupation. Presuming that each house is visited only once a month, then 26,000 distinct operations must be observed and noted by the inspector; but once a month is insufficient. In many bye-laws the surveyor has to give a certificate that the bye-laws have been complied with. If that certificate has any value attached to it, its author must have watched every stage of progress during the erection of the building it refers to, so that once a week is by no means too short a period for visitation; then the observations in West Ham come to 104,000 a month. But the writer is of opinion that every house ought to be daily visited, to give a practical effect to the bye-laws This multiplies the duties of the inspector by seven. The gravity of the case is such that neither exaggeration nor Utopian ideas are required to prove it. To properly supervise a district having houses completed at the rate of 200 a month, at least six inspectors are required. They must be men of some technical education, and sufficiently well paid to keep them above temptation. This would entail a cost on the rates of, probably, £1,200 a year. This in itself is a heavy charge on the rates, which a Sanitary Authority would resent; indeed, few surveyors would venture to ask for such an increase of staff, nor does it appear that it is a fair charge on the rates.

Sanitary Companies are offering to inspect houses for a guinea per annum. Very recently such an Association has been formed in Brighton. It has been very pertinently remarked that not for one guinea per annum, but for one guinea the sanitary authority could and would exercise such a supervision over new buildings as would satisfy all practical requirements, without puffing patentees' special wares. When such supervision is demanded some one must pay for it. Why should the rates be burdened by the charge? Why should not the builder pay, as he does in the Metropolis? One guinea would not add much to the capital sum expended on a house, nor would it exact much in the way of interest rent. In Eastbourne and in London these fees are chargeable, and th ratepayers are recouped for their outlay by those persons whose works require supervision. Let such fees be paid for an efficient staff, to be provided in all towns, and it will be found that a great work has been done which now remains to be accomplished.

By a Bill now before Parliament for confirming a Provisional Order of the Local Government Board, to come into operation on the 29th of September, the New River Tyne Port Sanitary Authority is to consist of fifteen members chosen by the following Urban Sanitary Authorities, viz.:—Two by the Gateshead, one by the Jarrow, six by the Newcastle-upon-Tyne, two by the South Shields, two by the Tynemouth, one by the Felling and Hebburn, and one by the Howdon, Walker, Wallsend, and Willington-Quay. The jurisdiction of the Authority is to extend over the whole of the Port of Newcastle, and so much of the Ports of North Shields and South Shields as abuts on the coast line between Cullercoats and the Herd Sand, together with so much of the said ports as forms part of the river Tyne.

CANAL BOAT CHILDREN.—We learn from the *American Sanitary Register*, that in France no child under fourteen years of age is allowed to live or work in a canal boat, and no woman is permitted to live in the barge cabins without special permission from head-quarters, although there is ample space for them. To prevent breaches of the law in these respects, special officers are appointed by the Government to board the boats, barges, etc., at certain points, it is to be hoped, with better results than are obtained by our system of inspection under the Canal Boats Act.

THE SINS OF THE PLUMBER.

By W. K. BURTON,
Resident Engineer to the London Sanitary Protection Association.

V.—THE DISCHARGE PIPES OF SINKS, AND THE OVERFLOW PIPES OF CISTERNS.

IT is in the arrangement of pipes which serve as the discharges from sinks, baths, basins, and other kindred appliances, that the plumber gives his imagination the freest scope, and would appear to exert, at times, his utmost ingenuity in devising skilful arrangements for 'laying on' sewer gas to the house.

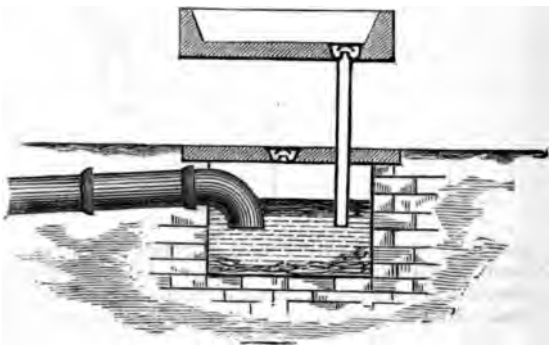
It would seem to be a rule so simple as not to be easily forgotten—*That every sanitary appliance other than a closet should discharge directly into the open air.* Yet, even at the present time, the plumber and builder who has got into the groove of the thing is to be found making his scullery sinks run directly into the drains, and leaving them untrapped, except for the quite useless little movable bell-trap which is fixed in the sink. Sometimes a syphon-trap, or D-trap, is used on the discharge-pipes, and this certainly is an improvement on the bell-trap; but even such an arrangement (a sink discharging through a syphon-trap direct to the drain) is not to be relied upon for safety. A certain amount of sewer gas may pass through the water of the trap. The water of the trap may be either sucked out by syphonage or may evaporate, in either of which cases a direct communication will be made between the drain and the house.

It must be admitted, however, that the plumbers and builders of the present day are gradually becoming imbued with a sense of the advisability of allowing their sinks, etc., to discharge into the open air: but a thing which they apparently will not take in is that, even when a pipe *does* discharge into the open air, it is still necessary to fix a trap on it.

However well a pipe may be flushed out, if any foul matter passes down it, it will in time become foul, and any air which passes along it into the house will smell of the foulness. Soapy water even will through time make a pipe so foul that air passing through it into the house will smell quite as bad as sewer gas, and be indistinguishable from it. I have known many cases where pipes have been disconnected from drains, and have been altered to discharge into the open air, no traps being fixed upon the pipes, and where the smell has been worse after the alteration than before. In the few cases where a trap is fixed on a discharge-pipe passing into the open air, it is generally found that the trap is rendered useless, because every time the appliance is used, the trap is sucked dry by the rush of water down the pipe. This can easily be prevented by carrying a ventilating pipe from immediately below the trap to the nearest convenient point in the open air.

I shall now give a few examples of malconnection of waste-pipes which I have seen.

In the first place, there is the extreme case of a pipe which discharges directly into a drain without even an apology for a trap. I must admit that this is not a common case, but it is to be met with. Next in order of merit—or demerit—comes the case, already twice mentioned, of a sink which discharges into a drain, the only protection being a bell-trap. Next comes, perhaps, the commonest connection of all—that in which a pipe is carried from the sink into a small built trap, or cesspool, below. This arrangement is very similar to one which I illustrated in connection with soil-pipes. It is objectionable for several reasons. In the first place, it forms a pit, which is always a lodging place for deposit, giving off foul gases, the greater, or, at least, a great part of which will probably find vent by the sink-pipe into the house. Then, again, such a structure is never quite watertight, but always allows a certain amount of leakage into the soil below. I have not, so far, been writing of scullery sinks, but of pantry sinks, fixed basins, etc. In the case of scullery sinks, it is common to find this fault in an exaggerated form. A huge receptacle is very commonly fixed under this sink. This frequently measures several feet square and about two feet deep. It is, in fact, nothing more nor less than a particularly offensive



cesspool in a peculiarly objectionable position, although it is usually dignified with the name of a grease-trap. I illustrate the arrangement to which I refer.

It is, unfortunately, a necessity that there should be grease-traps of some kind, at least, in the case of large houses; but these may generally be fixed out of doors, and may always be of glazed stoneware, which is a comparatively cleanly material.

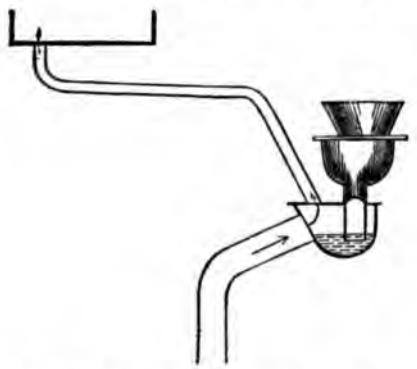
I say that it is an unfortunate necessity, because it is in opposition to the whole aim and object of modern sanitary science, which is to remove at once every trace of decomposable matter which may find its way into any appliance in the house. The storing up of grease, and other matter which will always accompany it, for weeks or, perhaps, months, is in direct opposition to this principle.

The large built grease-trap which I have sketched is always constructed without any ventilation, unless we may consider that it is ventilated by the bell-trap, which is commonly fixed in the floor above it, and which, as it is usually dry or without its bell, lets the foul gases emanating from the mass of decomposing matter in the grease-trap pass freely into the house.

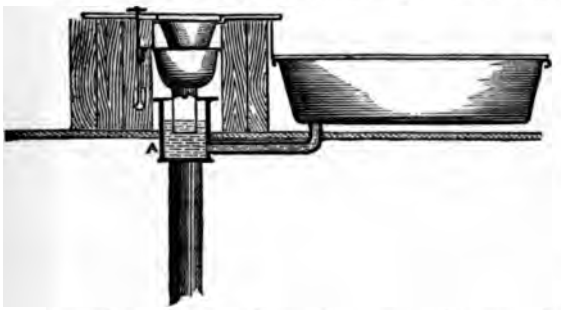
A very common form of connection for an upstairs sink or bath is to take the discharge-pipe directly into the trap of a closet. This is objectionable, because every time the closet is used, the contents of the trap are thoroughly agitated, and a puff of the smelling air which is given off finds its way up the discharge-pipe of the sink. To show that such a discharge of air does take place, let a candle be held with its flame just over the orifice of the discharge-pipe, and let the closet-handle be drawn. The flame will first probably be drawn inwards, and afterwards will be blown outwards. The objection to the arrangement is greatest when the D-trap is used under the closet, as then the contents of the trap

are unnecessarily foul, and as, moreover, the deposit is liable to be so great as to entirely choke the end of the discharge-pipe.

In one or two extreme cases that I have seen, the discharge-pipe did not pass into the D-trap under the water level—which would have the effect of trapping it, although it were with dirty water—but was simply soldered into the top of the trap. Of course, in this case, the soil-pipe, the drain, and, to a certain extent, the sewer, were simply ventilated



into the house. Another most objectionable arrangement which I have seen is that in which a bath or sink discharges into a closet-trap, the bottom of the both being level with, or even below, the level of the



water in the trap. In such a case, whenever the closet is used, a certain part of the contents of it is discharged into the bath or sink. I illustrate both of these arrangements.

The *overflow-pipes* of sinks, etc., are sometimes a cause of great annoyance. This pipe is generally branched into the discharge-pipe, and frequently ***below*** the trap on the latter. In such a case, the trap is, as a little consideration will show, of no use.

It is a very common thing to find that the drip-tray of a bath discharges into the drain or into a closet-trap, and it occasionally happens that when the bath discharge has been disconnected from the drains, and altered to discharge into the open air, the discharge from the drip-tray is left as it was.

I could enumerate many other cases of dangerous connections from sinks and other appliances, all differing more or less from the others; but were I to do so, I should simply be ringing the changes on faults which differ more in name than in anything else. It may be said that they all resolve themselves into this. A sink, bath, basin, or a drip-tray is connected to the drain or soil-pipe without any trap, or with a trap more or less imperfect, and frequently with an imperfect joint, too. Or, if the discharge-pipe has been carried into the open air, a trap is not fixed on the pipe to prevent a current of air from entering by it, and becoming contaminated on the way. In the comparatively rare instances where the trap *is* fixed on the discharge-pipe carried into the open air, the ventilating-pipe, which would prevent it from being sucked dry, is omitted.

There is, however, a case differing entirely from these, which is as pure a case of scamping as could be conceived, and which I have found to exist in more than one place. This is the occurrence of the discharge-pipe of a sink, which, from the fact of its going into the floor, would naturally be supposed to join the drain, but which, on further examination, turns out to be simply stuck into the ground! I have known one instance in which this was the case, although a drain passed within six inches of the end of the discharge-pipe. Of course, the result of such an arrangement is to contaminate the soil under the house to a very serious extent.

The objectionable arrangements here described as frequently found in connection with sinks also exist in the case of the overflow-pipes of cisterns, and probably lead to more mischief than all other sanitary defects put together.

It is a far more dangerous thing to carry the overflow of a cistern into a drain or soil-pipe than it is to treat the discharge-pipe of a sink in the same manner. In the case of the sink, it is, at least, probable that the trap on the pipe will be charged with water. In the case of the cistern overflow it is most unlikely.

Such an overflow-pipe is not intended to be put in use at all, except in the case of accident to the ball-valve, through which the water is supplied. Ball-valves are now made in great perfection, and it is not likely that any water will pass down the overflow-pipe from one year's end to another. The consequence is that the trap is dry, and a free communication between the drain and the house exists, and this, moreover, at that point where it is most dangerous, because it leads to the contamination of the drinking water.

THE METROPOLITAN PROVIDENT DISPENSARY MOVEMENT.

By William Allam.

In the language of Mr. Bousfield, one of the Vice-Chairmen, 'The scheme of the Metropolitan Provident Medical Association,* and Limited Company for the creation of Provident Dispensaries in every district of the Metropolis, on self-supporting and self-governing principles, is the fruit of several years' study, experience, and public discussion of the medical treatment of the working classes', and was adopted at a large representative meeting of Friendly and other Societies, held on the 17th April 1880, at the Cannon Street Hotel, when the first Council of the Association, about half of whom were members of the artizan class, was appointed.

The principles upon which Provident Dispensaries are constituted by the Association are briefly these. Each Dispensary has the services of a medical staff of respectable qualified practitioners resident in its neighbourhood, who receive a fixed proportion of its income. This is provided by the regular monthly contributions of the benefiting members, which, though small, and well within the means of those who pay them, are sufficient, when paid by a large

* The Offices of the Association are at 24, Bedford Street, Covent Garden, W.C.

number of members, to maintain the Dispensary. The members have a right to choose their own doctor from the medical staff, and to be attended at their own homes when necessary. Medicines of the best quality and most expensive kind are provided at the cost of the Dispensary; a dentist and midwife are attached to the staff; and arrangements are made to secure the assistance of skilled nurses when required. When fairly established, each Dispensary is managed by a local committee of *bonâ fide* members, in conjunction with representatives of the medical staff.

The Metropolitan Provident Dispensaries Company, Limited, was registered on the 27th of May 1880, for the purpose of aiding the Association in providing, by purchase, hire, or building, the premises required for the Provident Dispensaries in union with the Association, together with the fittings, furniture, and drugs necessary for working the same, and of advancing money to the Dispensaries on the security of these buildings. The Company is also empowered to provide, as far as may be necessary, for the expenses of the Metropolitan Provident Medical Association, such provision being limited to a maximum sum of £3,000. The authorised capital of the Company is £50,000, in shares of £1 each. Amongst the shareholders are Sir Rutherford Alcock, K.C.B., Mr. Balfour, M.P., The Duke of Bedford, Sir T. Fowell Buxton, Bart., Dr. Alfred Carpenter, The Earl of Derby, Sir U. Kay-Shuttleworth, Bart., Sir Curtis Lampson, Bart., Mr. Samuel Morley, M.P., Mr. F. D. Mocatta, Mr. Francis Peek, The Right Hon. W. H. Smith, M.P., The Right Hon. James Stansfeld, M.P., Sir Charles Trevelyan, Bart., K.C.B., Sir Sydney H. Waterlow, Bart., M.P., The Duke of Westminster, and Mr. Jones Loyd. Eight Provident Dispensaries have been already established by the Association, and others will soon follow, as several applications for Dispensaries in new districts have been made by bodies of working men.

The rules and rates of payment prepared by the Council have given satisfaction to a large number of members of the 'Hearts of Oak' and other Friendly Societies by whom the 'club doctor system' has not been adopted; and also to several Courts and Lodges of the 'Foresters', 'Odd Fellows' and other sick benefit organisations, who have in their corporate capacity already arranged to provide for the medical treatment of their members through the eight Dispensaries established by the Association—a manifest advantage, because every member will be able to choose a doctor within easy reach of his own home, as well as secure medical attendance for his wife and family. The Board of Delegates of the Hospital Saturday Fund have also unanimously resolved to put their local organisations at the service of the movement.

This is decidedly the greatest and best effort which has ever been made in London to diminish the indiscriminate system of out-door medical relief in practice at many of the Metropolitan hospitals, by providing a substitute suitable to the wants of the industrial classes, and honourable both to themselves and the medical profession.

Although only two of the dispensaries established by the Medical Association have been really in existence for a period of twelve months, and others not more than half that time, as many as 8,353 persons had become entitled to medical relief on the 1st of April; which shows beyond doubt that the working classes are not unwilling to subscribe a few pence weekly, in sickness and in health, to insure medical attendance and medicines when overtaken by illness; and there are strong reasons for believing that they much prefer doing so to the plan of going to the out-patients' department of a hospital, and waiting several hours in a crowded and sometimes infectious waiting-room, only to receive in the end, after so much wasted time and trouble, the hurried attention of an over-worked medical man, who is, it is stated, sometimes obliged to diagnose and prescribe for his unfortunate patients at the rate of sixty per hour.

No one knows better than the hospital doctors themselves, how utterly worthless, under these circumstances, their advice must be, and how exceedingly painful it is to them to perform such duties at all. Now the prompt and efficient medical treatment of the working classes is a matter of the gravest national importance, and cannot be any longer dealt with in an inefficient manner. There can be no doubt that under the present defective system, the bread-winner is often lost to his wife and family, through being unable to obtain the help of a competent medical man at an early or critical stage of disease; and Dr. Alfred Carpenter has stated that a very large number of the serious cases of illness found in the Poor-Law Medical Relief Books are chronic cases, some of which had become chronic for want of immediate medical attention in the first instance, which was not obtained because it was not at hand, and could not be paid for in the ordinary way.

The prevailing system in London is so imperfect, that in all human probability there is at the present moment an enormous amount of suffering going on out of sight, which ought to be, and could be effectually relieved, if the means of relief were ready at hand. What is wanted, is some fifty, or more, self-supporting provident dispensaries, where medicine and advice could be obtained at once, either at the dispensary or the members' own homes, in return for a regular monthly or weekly payment, too small to become a burden.

From a purely medical standpoint, the scheme of the Metropolitan Medical Association is a good one, because it lays down the only practicable method of bringing under contribution to the medical profession that large honest, industrious, and independent class of persons who are not eligible for poor-law medical relief, yet cannot afford to pay the ordinary fees charged by qualified medical men. And it also provides that serious and difficult cases occurring at the dispensaries shall be sent on to the hospitals for consultation and study. If the working classes consider this, they have it in their power to make it a grand success. They have long ago secured for themselves a pecuniary benefit at a time of sickness, and they now have a splendid opportunity of providing themselves and their families with medical aid and medicine, without running the risk of a doctor's bill.

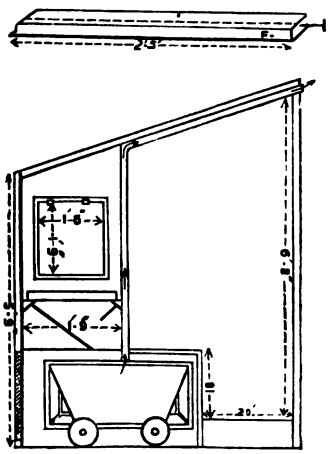
At the last meeting of the Council of the Society for the Reform of Slaughter-houses, the president, Dr. Richardson, F.R.S., in the chair, a draft report on the inspection of public and private slaughter-houses, London and Provincial, by Messrs. F. Talfourd Chater and H. F. Lester, was submitted, and it was decided to call a public meeting of the Society to receive the report. The name of the Right Hon. W. E. Forster was added to the list of patrons, and a communication was read from Mr. Kennett, of Petersfield, intimating that he would give 200 guineas to the Society towards the construction of a model abattoir, if in the course of two months four other persons would contribute the same amount.

COMBINED PRIVY AND ASH-PIT FOR RURAL DISTRICTS.

Designed by JNO. F. HERRING,
Medical Officer of Health, Builth Rural Sanitary Authority.

THE Public Health Act, 1875, sections 35, 36, and 37., whilst conferring powers on sanitary boards to enforce the erection of a closet or privy for each tenancy, judiciously leaves the details as to site, material, and mode of construction, to the Local Authority of the district, who may allow modifications which it would have been impossible to anticipate in an Act of Parliament. This discretion, however, renders it desirable that each Rural Sanitary Authority, unless provided with a system of sewers to allow of the erection of water-closets, should adopt an approved plan and specification of privy for use within their district, so that an official notice for erection of a closet would be followed by the provision of a suitable convenience, instead of a miserable make-shift which enables the owner to escape legal penalties, but is of doubtful sanitary value.

Following out this idea, the annexed illustrations represent the combined privy and ash-pit which has been approved by the Rural Sanitary Authority of



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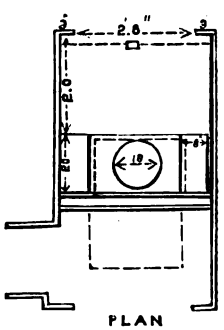
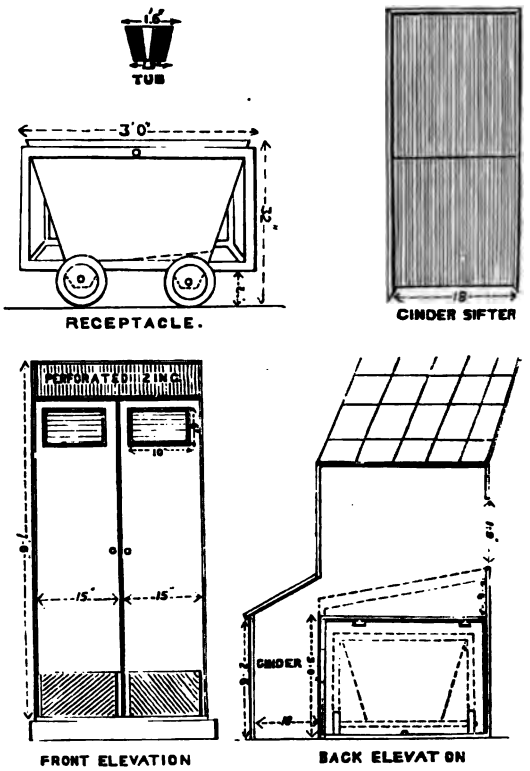


PLAN

this Union. It will be seen that it is only adapted for rural districts, where garden or cultivated ground is available, but as the majority of cottages are so provided, the proposed privy would be widely suitable. The large number of excellent closets already designed and in use, would seem to render any further efforts in this direction unnecessary. I think, however, there are a few features of novelty in the proposed privy, which may recommend it to other medical officers who may have to advise their Boards on this subject. The plan will be readily understood from



the woodcuts, and does not require any lengthy description. It will suffice to call attention to one or two points of novelty in construction.

1. The entrance doors are divided in two, so that the floor space can be made smaller, and the entire length of the building from back to front correspondingly reduced.

2. The ventilation of the closet is accomplished by louvred openings in the doors, and that of the soil receptacle, by a 4-inch space between the walls of the closet and the cinder chamber; the opening is continued between the ceiling and the slates, and has its outlet through a perforated zinc panel over the doors. The aperture of entrance is 36 in. by 4 in., giving a superficial area of one foot.

3. The soil receptacle is built in the form of a wagon hung in a frame provided with wheels. The capacity is 6.8 cubic feet, equal to 42 gallons. Assuming the daily excreta from a mixed population to be three ounces of solid matter and thirty of urine per head, and the ash passing in through the sifters about half-a-pound per head per day, in a household of six persons, the wagon would not require emptying oftener than once in twenty-one days. The floor of the receptacle has a slight inclination from before backwards, so that the urine and fluid matters flow to the rear, where they are brought immediately into contact with the ash from the sifter.

4. When requiring emptying, the wagon can be drawn out of its chamber by the door at the back of the closet, wheeled to any convenient part of the garden, and, being hung on a pivot, the tub can be tipped into a trench or compost heap with little trouble. After being swept out, and, if necessary,

dusted with carbolic powder, terebene, or other disinfectant, it would be ready for use again.

5. The floor of the wagon chamber is laid with a three-inch flagstone; during the emptying of the tub, this could be swept or washed out and disinfected, so that no decomposing matter would be retained to give rise to offensive effluvia.

The cinder sifter is of the ordinary type, and scarcely requires explanation. It is furnished with a bolt which can be shut from the closet to prevent the sifter and the privy being used simultaneously.

The privy at present in use in the neighbourhood is provided with a cesspit, bricked and cemented. In comparison with it, the proposed closet offers the following advantages:—

(*a*) More frequent necessity for emptying, with increased facility for accomplishing it.

(*b*) Easy access to all parts of the closet, seat, and receptacle, so as to allow of being kept thoroughly clean and disinfected.

(*c*) No soakage into soil to contaminate the water-supply.

The disadvantages may be: The necessity for a certain amount of care and attention, both as to the method and frequency of emptying, and selection of ground for final disposal of the excreta. In a rural district where gardening is understood and enjoyed, neither of these difficulties should be formidable, for the manurial value of the tub contents would, I think, ensure the necessary attention, both to emptying and storage. Carelessness in these respects would come under the notice of the Nuisance Inspector, and owing to the ease with which the inattention could be remedied, he would probably see the nuisance abated before leaving, and so obviate the necessity for issuing a routine notice. I am informed the cost of the closet would not exceed £5 or £5 10s.

The *Comptes Rendus* contains a note 'On the Electrolysis of Distilled Water', by M. Tommasi. His experiments prove that water may be electrolysed, even by the current of a very weak battery, provided the calories liberated by this battery are at least equal to the calories absorbed by water in being decomposed, about 69 calories.

M. d'Arsonval has invented an apparatus for uninterruptedly preparing oxygen without the agency of heat. The principle is based on the mutual decomposition of oxidised water and chromic acid. The apparatus is composed of two flasks, one containing clippings of bioxyde of barium (its cork is pierced with two holes), another, of which the lower part is tubulated, and contains bichromate of potassium dissolved in hydrochloric acid in excess. The two flasks are connected by an India-rubber tube, which also conveys the stream of chronic solution to fall on the bioxide of barium. The hydrochloric acid in excess in contact with the bioxide of barium gives oxidised water; the oxidised water in contact with chromic acid decomposes, and causes the chromic acid to decompose. Thus there is a stream of oxygen generated by two distinct decompositions, and which is easily regulated by controlling the flow of the liquid. If the apparatus is arranged according to Deville's method, the flow stops automatically.

Doctor Henri Napias has recently published a Manual of Hygiene, thus adding one more to the list comprising the names of Lacassagne, Proust, Bouchardat, and Arnould. M. Napias gives an excellent *résumé* of documents relating to sanitary legislation and administration. Industrial hygiene is fully treated in all its laws and bye-laws. M. Napias has reserved considerable space for treating the scientific aspect of hygiene, and furnishes most useful information and data for the guidance of members of hygienic commissions, Inspectors of Nuisances and of Factories; also for Mayors and other public functionaries.

THE
SANITARY RECORD.
JUNE 15, 1882.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

WATER RATES.

THE privilege of paying rates is one of the first which is found in practice to attach to the privilege of becoming a householder, and accordingly, there is no branch of local law which more often requires and receives investigation. Parish rates, as we now have them, may be said to date from 43 Elizabeth, when the Poor Rate was first established. That Statute remains unrepealed to the present day, and is the basis of all our modern rates; but, naturally, the growth of the country, and the development of modern civilisation, have led to a great increase in the number of our Local Rates, and in the conditions and details which surround the processes of levying them. The subject in all its bearings would, of course, occupy more space than we could give to it, but from time to time we insert amongst our 'Brief Notes of Cases', particulars of Cases relating to rates and rating which lay down important principles and are likely to be useful in keeping our readers *au courant* with the decisions of the Courts of Law. Our present purpose in particular, is to offer a few observations on some recent controversies which have arisen respecting the levy of Water Rates in London and at Warrington. The cases to which we allude are those of the *Warrington Water Company* v. *Longshaw*, and *Dobbs* v. *Grand Junction Water Co.*, decided in the Queen's Bench Division on May 26th. The facts in these cases were not in all particulars identical, and the judgment of the Court involved some knotty details connected with the interpretation of the various statutes referred to.

Stripped as far as possible of technicalities, the point in dispute was this:—When a water company is entitled to charge a Water Rate based on 'Annual Value', what is to be understood by this and kindred expressions? Our readers are no doubt aware, that properties are entered in a Parish Rate-Book in two columns, respectively called 'Gross estimated Rental' and 'Net Rateable Value'. The former is supposed to represent the nominal full value of the property, the latter the effective annual value, after making certain inevitable deductions, which the law authorises to be made. The difference will vary under different circumstances to the extent of from 10 to 30 per cent., so that properties estimated to be worth £100 a year gross, may be actually

rated at only £99, £80, £70, or even less. It will at once appear that it will make a great difference to a Water Company, and also to the householder, their victim, whether they are entitled to levy their four or five per cent. water rate on the full £100, or must do so on the depreciated effective value of £80, £70, or whatever it may be. This is, broadly, the point which was submitted to the Queen's Bench Division, and the Court has decided in the cases before it, that the companies concerned were only entitled to charge on the reduced scale. It is to be understood, of course, that the decision being based upon Special Acts, and not upon a Public General Act, is not therefore, of universal obligation, but probably there are in operation in England many Acts resembling those just reviewed by the Courts, which hitherto have been interpreted by water companies in their own way, and hitherto have been interpreted wrongfully, and by means of which many ratepayers will now be able to demand a reduction in their future rates.

There is another matter incidentally arising out of the decision in the Grand Junction case, of very great importance to ratepayers living in London. It may be considered as settled, that the buying up of the London Water Companies by some Public Authority, is now only a question of time. The amount of the purchase money will depend in some measure, on the annual profits earned by the companies; but these annual profits will vary greatly according as they are raised on the basis heretofore adopted by the Grand Junction Company, or on the basis which the Court of Queen's Bench requires the Grand Junction Company henceforward to adopt. As the Company has appealed against the decision just given, the foregoing remarks may suffice for the present; but if the decision is affirmed on appeal (as we fully expect it will be), we may revert to the subject on a future occasion.

ANTI-VACCINATION STATISTICS.

THE London Society for the Abolition of Compulsory Vaccination has recently published, under the general title of Vital Statistics, a small volume by that veteran opponent of vaccination, Dr. Charles I. Pearce. It is not surprising to find that, starting, as Dr. Pearce does, on entirely false premises, namely, the recent 'great increase' of small-pox fatality, and the 'child slaughter' due to vaccination, the effort to raise a sound statistical structure on such a base is, viewed statistically, an egregious failure. It is quite possible, on the ground of the failure of infant vaccination to fulfil all the sanguine anticipations of its discoverer, to comprehend such conscientious antipathy to compulsory vaccination as that displayed by Dr. Pearce, but it is incomprehensible that anyone should justify to himself the publication of such a one-sided and fallacious statement of the case, between small-pox and vaccination, as that just published by Dr. Pearce.

Considering the mass of facts and figures that has in the last five years been placed before the public on this subject, it is inexcusable in an advocate of one side of the question to ignore all that can be urged on the other. It is impossible, and it would be a waste of time, seriously to discuss the figures and assertions of Dr. Pearce, when it is not a fact either that small-pox fatality has increased, or that infant mortality has increased, since the introduction of compulsory vaccination. It is beyond all dispute that the average annual death-rate from small-pox in England and Wales averaged 420 per million during the whole period for which such information is available, between the institution of civil registration of deaths and the passing of the first compulsory Vaccination Act in 1853; and it is also indisputable that in the past twenty-eight years of compulsory vaccination (1854-81) the death-rate from small-pox has fallen to 196 per million. It is more than reckless in the face of such facts to assert, and base a volume upon, the recent increase of small-pox fatality in the United Kingdom.

Apart, however, from the entirely false issues raised by Dr. Pearce, the book contains inexcusable blunders which, unfortunately, fit in with the theory which he sets himself to propound. He gives in many parts of his book the annual death-rate per million from small-pox in England and Wales during the five years 1875-9 as equal to 344, whereas the correct figure is only 82 per million, and what makes the blunder more unaccountable and mischievous is that he states that this false figure was furnished to him from the General Register Office, although any recent Annual Report of the Registrar-General would have supplied him with the correct figure. The remarkable fatality of the small-pox epidemic of 1871-2, of which Dr. Pearce makes so much, is beyond question, but the low rate of small-pox mortality in the nine subsequent years, 1873-81, is also remarkable, although it suits Dr. Pearce to ignore the fact, and indeed to mistate it.

CONTINUOUS BRAKES.

ATTENTION has recently been drawn by the Duke of Westminster to the excessive vibration in houses caused in a portion of the Metropolis by the continuous brake system used on the Metropolitan Railway, and his surveyor predicts some grave disaster, including loss of life, unless remedial steps are taken. It would appear that when underground railways were sanctioned by Parliament no precautions were taken against the action of continuous brakes, for the simple reason that none were then invented. The complaint is, that buildings are shaken from cellar to attic by the high-speed running of the Underground trains, followed by the sudden jerking of the convoy rendered necessary to bring up the train to a standstill within the shortest possible space. As far as the precedent of law goes,

the companies appear to have the best of it, as the House of Lords rejected the idea of compensating Mr. Brand for similar suffering in his house at Hammersmith, by a majority of two to one. This decision, however, did not show how the matter was esteemed in the law courts, because the Exchequer Chamber and the judges who advised the House of Lords considered that the plaintiff was entitled to compensation for the damage done to his house by the passing trains. Possibly at some future time a test trial or two will decide this question upon the new basis, and set the matter at rest, by compelling the railway companies to provide brakes which shall effectually control locomotion without causing any such appreciable vibration in surrounding structures.

It is a serious thing to have the sick disturbed, the hands shaken of persons engaged in delicate manipulative work, or scientific instruments rendered useless; but it is a more serious thing to reside in a house placed over a rumbling burrow, with a chance of its causing to topple over the residence placed above it. The last mentioned disaster is possibly remote, or might never occur; nevertheless, there may be badly-built houses in which the danger is imminent and certainly His Grace has done a public service in drawing attention to the matter. Everyone is aware that a heavy luggage train is capable of shaking a house a hundred yards away, when labouring along, even in the outer air, and without the use of a brake. But the mischief must be intensified when this factor of complaint is immediately underneath or in close proximity to the walls of a residence. One becomes accustomed to it, just as the people at Comrie, in Perthshire, take no heed of the constant earthquake shocks which disturb their crockery, but the matter assumes a graver shade when the house itself shakes, when danger is predicted by an experienced surveyor, with the accruing doubt in the mind that he may have stated the case but mildly.

Let us see how this excessive vibration can affect the sanitary condition of a house. It may disturb the jointing of the underground drain-pipes, even supposing they were surrounded by concrete, and cause them to leak, thus saturating the subsoil with dangerous filth; or it may simply fracture the junction between the earthenware pipe and the soil-pipe, which might possibly be as great an evil as the other, inasmuch as the upright soil-pipe would form a conduction to the foul air, and distribute it at various levels of the house between joists. It might even do more, for it might loosen the tacks of the soil-pipe, or break the soldered joint of the soil-pipe, in both cases delivering irrespirable air into the living and sleeping rooms. It would indeed be a matter of enquiry well worth prosecuting, where the vibrations are most complained of, to see whether such evil results have already made themselves manifest.

AMBULANCE HOSPITALS FOR SMALL-POX.

A COMMUNICATION, read at a Sanitary Convention at Ann Arbor, March 1st, 1882, by Dr. Lyster, Professor of the Principles and Practice of Medicine, Michigan Medical College, professes to treat of ambulance hospitals for small-pox; but in the text of the paper there is scarcely a word on the subject, and nothing whatever of the smallest value. Of the other statements unconnected with ambulance hospitals for small-pox, it may be said that they are either wholly wrong or altogether misleading. As a specimen of the first class, let us take the following:—'I have never seen an unvaccinated anti-vaccinationist, and I do not believe that one can be found. They have generally had themselves and their families well vaccinated on both arms, before adopting the new scepticisms on this subject.'

This statement is simply untrue. Those who have had extensive experience of small-pox have over and over again found too many 'unvaccinated anti-vaccinationists'—men, who honestly believe the whole theory of vaccination to be a 'sham'; who have the courage of their convictions; and who not unfrequently pay the penalty of them. The present writer at least sees no reason why all anti-vaccinationists should be called 'liars'. There are doubtless amongst them, as amongst all classes of men, the rogue and the vagabond, but that the bulk of them are honest men, we entertain no manner of doubt. Let us now take a statement of the misleading kind. 'The general weight of opinion amongst those who have given much thought and study to the subject of infectious and contagious diseases, is against the aggregation of the sick in large numbers under one roof, except under the most favourable management in regard to ventilation and cleanliness, and disinfection'. In this country, at least, it has never been proposed, much less carried out, to treat large numbers of cases of infectious disease under one roof; and except with due regard to ventilation, cleanliness, and disinfection, neither few nor many cases can be treated anywhere.

The one important point in the treatment of the infectious sick is to give each person the amount of cubic space which his individual case requires, 2,000 or 10,000 cubic feet, as the case may be, with natural ventilation by open windows and liberal nursing; and when this is done it is of no consequence whether ten or ten thousand persons are aggregated, *i.e.*, as we mean, treated on a space of ground, which, for administrative purposes, is one and the same space. The plain truth on this matter is, that in the present day too many people speak about what they have no practical experience of. Another statement of the same kind is the following:—'The small-pox hospital will deteriorate the value of property wherever it may be situated, as far as it can be seen, or at least, to the extent of a mile distant in every direction'. This is incorrect. At the trial o

Hill *versus* the Managers of the Asylums Board, it came out that the value of property in Hampstead had actually risen after the opening of the Hampstead Small-pox Hospital, and that building generally was on the increase. Around Homerton and Deptford, the hospitals have, in the last few years, notwithstanding the agitation which has been going on, been surrounded with houses, the public apparently very sceptical of the dangers incident to the vicinity of a small-pox hospital. At Homerton the population has increased by thousands, and at Deptford, building has been carried to the very gates of the small-pox hospital!

Dr. Lyster is opinion that huts and tents are more suitable for the treatment of infectious diseases, and the diseases incident to war. This very questionable statement is supported on the following grounds :—

'*Treatment of Disease.*—In the Austrian army, 1854, the results of tent hospitals were very satisfactory. The most severe maladies ran their course much more mildly in the free air of tents and recovered more quickly and more perfectly than in the confined spaces of hospitals.

'*Experience from* 1854 *to* 1860.—Typhoid fever in its severe forms was treated more successfully in tents than in hospitals, less than twenty-one per cent. of admissions proving fatal in tents, while thirty per cent. admitted to permanent hospitals died.

'*Small-pox.*—In the tent cases, the eruptions came out quicker and better, and matured more rapidly, and the dessication and convalescence were not followed by any sequences. In permanent hospitals the course was longer, the stages less defined, recession of the eruptions was more common, after-diseases more frequent.

'*Wounds and other Inflammations.*—Of all cases treated in tents, these showed the most favourable results. In 1859, a number of wounded men were sent from Italy. All severe cases were sent into tents, the slighter cases into wards. All the men in tents had a fresh, lively look, and contrasted very strongly with those in wards. In the wards, although doors and windows were left open almost the entire day, and the greatest care was taken with treatment, hospital gangrene occurred. All this was mended at once, when men were transferred to the tents. In no single case did a gangrene occur in the tents.'

This, in our opinion, is simply incoherent writing. 'The results of tent hospitals were very satisfactory.' Were they? With what other hospitals were they compared? What were the diseases? What were the age and sex of the persons suffering from them; and what were the percentages of death in each class of disease, each quinquennium, and each sex in the tents and the hospitals with confined spaces respectively? And if the diseases were such as small-pox, typhus, and scarlet fever, was the comparison of cases treated in the hospitals, and in the tents, made at the same period of the epidemic? Further, on what principles is it assumed that the spaces of hospitals are confined? They may be, as tents and huts may be. Indeed in winter, tents are more likely to be 'confined spaces', because of the difficulty of heating them, and the tendency to close the ventilators. It is an entire mistake to suppose that a tent, as a tent, is self-ventilating. Tents, like hospitals, may be, and have been, over-crowded, and that to a dangerous extent. Enteric fever, we are told, was treated more successfully in tents than in hospitals, *because* the mortality in the tents was but about 21 per cent. as compared with 30 per cent. in the hospitals. What hospitals? That certain cases of enteric fever in certain tents, at a certain time, gave a smaller mortality than certain cases in certain permanent hospitals at the same time is, in our opinion, so far as the bare statement is evidence at all, simply evidence that the cases in the tents were mild cases, and the cases in the hospitals severe cases. As a matter of fact, the tendency in London was to place the mild and convalescent cases in the tents, and the severe cases in the permanent buildings, and this practice would probably explain Dr. Lyster's figures.

An extended experience teaches that enteric fever has a natural history, and that, usually, the conclusion to be drawn from a small mortality is, that the cases were mild, and from a large mortality, that the cases were severe. Certain German physicians have treated enteric fever on a large scale without a mortality, and there are physicians in London who believe them. Their faith must be great. If, however, Dr. Lyster's tent mortality be compared with the mortality of the large London fever hospitals, Liverpool Road, Homerton, and Stockwell, it will be seen that Dr. Lyster's tents compare very unfavourably with the permanent hospitals. During the ten years 1871-80, the following were the admissions, the deaths, and the mortality, in the London fever hospitals.

	Cases.	Deaths.	Mort. p. c.
Liverpool Road ...	954	168	17.61
Homerton ...	1,615	288	17.83
Stockwell ...	1,196	274	22.0
	3,765	730	19.

It will be here seen, that over the long period of ten years, and in a large number of cases, the mortality was, in the permanent buildings, 2 per cent. lower than in Dr. Lyster's tents, taking all the hospitals; and in each of two of them 4 per cent. lower. But the most remarkable of Dr. Lyster's statements is the following : 'All severe cases were sent into tents, the slighter cases into wards. All the men in tents had a fresh, lively look, and contrasted very strongly with those in wards,' which, in plain English, means that the worst cases were the mildest cases, and therefore recovered better than the others; a contradiction in tents! There is a place for tents, a place for huts, and a place for permanent hospitals, in military medicine, and in the treatment of infectious disease, and the results of treatment in the three may be usefully compared; but this, to be of use, must be put down with some approximation to completeness, and not in the loose disjointed manner before us. Our own opinion is, that on the whole the hut made of good deal boards is the best place to treat infectious disease, *because* you can wash it with soap and boiling water, scrub it and dry it, and no method of disinfection is equal to this. It is simple, and it is also effectual.

NOTES OF THE MONTH.

TYPHOID FEVER AND INFECTED MILK.

Another of the now frequent epidemics of typhoid fever due to infected milk has been the subject of investigation by Dr. Elgar Buck of Leicester. The outbreak occurred at the Leicester Infirmary, where twelve cases occurred, all amongst drinkers of raw milk, and most of them exclusive drinkers of raw milk. The milk purveyor supplied the infirmary only, and died of hæmorrhage from typhoid during the outbreak. At the farm premises, the well was found near an overflowing and leaky cesspool, and an analysis proved that the water used for domestic purposes, and with which the milk-cans were washed, was quite unfit for use, being polluted with sewage. When the supply of milk was stopped, no more cases occurred, though the water-supply and drainage were not altered. Fortunately, most of the milk used to be boiled, and the drinkers of boiled milk, as usual, escaped. Dr. Buck promises a full report on the epidemic, which will be awaited with much interest.

INSURANCE OF WATER FITTINGS.

The Water Committee of the Corporation of Birmingham have under consideration the desirability of undertaking the repairs of water service fittings in dwelling-houses and premises, supplied otherwise than by meter, upon the payment of a fixed annual sum, on the principle of insurance. The system will cover all damage caused by frost, or by usual wear and tear. It will be entirely optional with the water tenants or customers, whether or not they will insure under the scheme. Before finally adopting the scheme, the Committee are desirous of ascertaining whether it is likely to receive such general assent from their customers, as to render it self-supporting, and they have, therefore, issued circulars to water consumers, asking for their assent to the proposal. If the scheme should be adopted, it is intended to bring it into operation at Midsummer. The scale of charges ranges from one shilling per annum on a water rental of £1, to five shillings on a rental of £5, and so on by shillings, for each additional pound or fraction of a pound. Baths are to be charged half-a-crown extra, and each water-closet five shillings extra.

THE ALKALI ACTS.

A case of considerable importance has been recently decided at the Wigan County Court, where a farmer sued a chemical company for £18, the amount of damage to his crops by the emission of noxious vapours from the defendants' works. The plaintiff occupied a field adjoining the works, which he planted with potatoes in 1879 and 1880, and sowed with wheat in 1881. In all these years, it was alleged the crops had been damaged by noxious vapours coming from the works, the leaves of the potato plants being burnt off or rendered of a brown colour, and the wheat ears being also of the same colour. The plaintiff also stated that on many occasions he had seen coming from the chimney of the defendants' works a yellow smoke, which was almost suffocating and fell on the field. For the defence, it was urged that the company had in use during the whole of that period a condenser, for the purpose of condensing the noxious vapours arising in the manufacture carried on, and that it had thoroughly and efficiently answered its purpose. The manager of the works stated that no gases had been allowed to escape from the works during the three years in question, and it was more likely that the damage to the crops had been caused by the vapours given off from the steam-boats on the canal, which frequently had to stop opposite the field before going through the lock. Dr. Angus Smith and Dr. A. Blackie, inspectors of alkali works, bore testimony to the efficacy of the condenser now in use at the defendants' works. It was held, however, that the evidence of the plaintiff was uncontradicted, and a verdict was given accordingly.

FRENCH VITAL STATISTICS.

The French population returns for 1880 just published show that the births in 1880 were 920,177, of which 68,227 were illegitimate; the deaths were 857,337, and the marriages 279,035. Compared with 1879, this shows a decrease of 160,352 in births and of 3,741 in marriages, with an increase of 18,455 in deaths. It may be noted that the illegitimate births increased by 259. The year's augmentation of population was 61,840, as compared with 96,647 in 1879. In 36 Departments the deaths exceeded the births, the Seine (Paris) being among them, although the great mortality among infants sent out to nurse principally swells the returns for outlying Departments. The chief set-off to this reduction of population is contributed by Brittany and Flanders. The returns, as a whole, are more than usually unfavourable, especially when coupled with the subsequent census, showing an influx into the towns, which tendency involves a higher rate of mortality.

MINERAL PULP AS AN ADULTERANT OF BREAD.

A sample of bread made from flour adulterated with soapstone pulp, in the proportion of two tablespoonfuls of the adulterant to a tea-cup of flour, together with a specimen of the pulp, has been submitted for analysis at Easton, Pennsylvania. There are, it is stated, four mills in Easton engaged in the preparation of this material, and large quantities of it are shipped to other places, one firm alone producing fifteen tons daily. The manner in which the pulp is shipped has attracted attention, and it has been suggested that it may be used in the adulteration of flour or bread. The following is the report of Dr. Charles Stuart, giving the results of an analysis of the sample furnished: The substance submitted for examination is a smooth gray powder, consisting of silicate of magnesia and alumina, with some carbonate and a trace of iron; specific gravity, 2.2. It yielded 40.4 per cent. of silica, 27.4 of magnesia, and 7.5 of alumina. The bread is dark, compact, and tough, and would by most people be considered an inferior, if not a suspicious-looking article. An unusual number of amorphous granules were seen when the crumb was submitted to the microscope, and the suspicion attached to them was developed by their refusal to take the blue colour with iodine. The ash weighed 2.66 per cent., and yielded .66 per cent. of silica, 1.04 of alumina and its phosphate, and .569 of magnesia. The last is a normal constituent of wheat flour to the amount of about .20 per cent.; if this is deducted from the amount found in the bread, and the remainder calculated into mineral pulp, the presence of 1.35 of the adulterant would be indicated, or 94.5 grains per pound avoirdupois. The ash

of fifty-eight flour samples recently examined averaged .525 per cent. When flour is baked into bread, a slight addition is made to the mineral constituents; but when the bread ash becomes higher than 1.25 per cent., gross carelessness in baking or fraudulent additions may be suspected. If this normal ash is deducted from that of the present adulterated specimen, the remainder, 1.41 per cent., would be equivalent to 98.7 grains per pound. The report adds that as the small increase in weight is obtained at the expense of the appearance of the bread, it is hardly conceivable that this substance would be used in bread-making with fraudulent intent. Its admixture with flour is possible, but unlikely, and would readily be detected by the examination of the ash.

PHTHISIS AND DAMPNESS OF SITE.

As a contribution towards the interesting question as to the relation of dampness of site to the production of phthisis, some recent remarks by Mr. J. F. Herring, in a sensible and well argued report presented to the Builth Rural Sanitary Authority, may not be uninteresting. The unusual mortality from consumption in a district which has so many natural advantages, and so few of the unfavourable circumstances that produce the disease in large towns is certainly surprising. In three districts of England and three of Wales selected as corresponding pretty nearly in population, houses, and industry, the mortality from phthisis was 0.36 per cent. higher in the Welsh than in the English districts. Mr. Herring is of opinion that this excess is, to some extent, due to sanitary defects, and more especially in house construction. The situations chosen for house sites are frequently most unhealthy. They are to be found placed at the bottom of basin-like hollows, the natural gravitation point for all the surrounding moisture, instead of on the edge or summit; or close on the banks of a stream with high ground all around them; or in the vicinity of a bog or marsh; or facing the north or north-east when a southerly aspect was equally available; or again, on the side of a hill with no space between the house and the higher ground. This latter is a very common practice, and in a mountainous district cannot be wondered at. Eaves troughing is seldom seen, so that all the rain falling on the back roof runs into the soil behind the house. Moreover, the foundations are often very defective, if not entirely absent. In many cases the floors of the lower rooms are simply formed of pavement, or of boards or joists laid on the earth, the sub-floor space being neither drained nor ventilated. The construction is in many cases very inferior; the walls (generally rubble) are not furnished with a damp course, and, in consequence, draw the moisture from the foundations, so that in wet weather, what with absorption and attraction, the entire atmosphere of the house is damp and unwholesome. Overcrowding, also, is not unknown in the district, and referring to this, Mr. Herring observes, that as regards phthisis, the effect of overcrowded sleeping rooms is disastrous. Mr. Herring also deals with the remaining remote causes of phthisis—hereditary predisposition, malnutrition, mental anxiety and depression, hyperlactation, and consanguineous marriages. Alluding specially to the subject of malnutrition, Mr. Herring found a regular supply of new milk to cottagers, or even farmers, to be the exception rather than the rule. In dealing with consanguineous marriages, he remarks, that if these are a remote cause of phthisis, then one more reason for the high death-rate in the district is known, for the practice is common. Possibly, Mr. Herring adds, with the increased facilities for travelling obtained within the last few years, and the gradual disappearance of the difficulties attending the use of the two languages, even this cause may be somewhat diminished in future.

CHILDREN'S HOLIDAY COLONIES.

Several interesting reports have reached us as to the working, in some of the more important German cities, of the organisations founded upon the principles laid down by Dr. Bion of Zürich for the purpose of providing weakly children in town schools with the advantage of country residence during their summer holidays. The subject has recently acquired fresh importance in German philanthropic circles by the Conference held at Berlin under the presidency of Dr. Falk (the Minister of State), at which delegates from the various German organisations met to exchange opinions and to compare results. The Crown Princess attended the Conference and took a marked interest in its proceedings. The Frankfürt Society having been the pioneer of the movement in Germany, its action partakes of a representative character, and the record of its work gives a general idea of that which other similar bodies carry out annually. The funds are provided by an annual contribution of five marks (5s.) from each member, and by donations. The latter form of contribution has been on a large scale during last year, and the Report before us suggests the capitalisation of such subscriptions, with a view to making the organisation to a certain extent self-supporting. The selection of children is made, without distinction of creed, from the various schools attended by children in necessitous circumstances. The children recommended by their teachers to the Society numbered last year 600, of which 179 were accepted, after due medical supervision and careful examination by a competent matron. To this party (of which 89 were boys and 90 girls), 15 teachers were allotted (7 male and 8 female). The localities chosen for these expeditions (15 in all, to allow of one teacher to each) were in suitable mountainous and wooded districts, and while sufficiently removed from Frankfürt to make the change of air as decided as possible, were within the limits of economical railway journeys. The object of dividing the children into such comparatively small sections is to make their stay in the country partake of the character of family life as far as possible, instead of being a counterpart of school *régime*. The stay at the colonies (which are at farmers' and other houses able to afford the requisite accommodation) is fixed at 25 days. The statistics given in the report before us are both novel and interesting. The average weight of the children taken in hand since 1878 (who ranged from 8 to 15 years of age) was about 54 lbs., this low figure being mostly caused by the notable thinness of the elder children. The 25 days of country life caused last year an increase of weight in all the children except six; the amount gained varying from 1 to 7 lbs. per child, and the average showing about 2 lbs. increase. There was also a gain in height in most cases. What makes these facts still more interesting is, that subsequent examinations of the children's growth showed that the increase of vitality thus acquired was not arrested on their return to their homes, but continued in operation, although in a less marked proportion. The cost of the excursions (including everything connected with

them) amounted to a sum representing £2 14s. per child. The reports of the Cologne and Barmen Societies show equally satisfactory results, as also does the record of the Düsseldorf organisation. The latter body, in addition to the work we have described, provided daily meals during the holiday time for 115 children in the town itself.

SANITATION AT BOSTON, U.S.A.

Mr. Vacher of Birkenhead lately read a paper on this subject at a meeting of the North-Western Association of Medical Officers of Health, in which he points out the elaborate system adopted for supervising and carrying out the sanitary arrangements of this city. The Committee of Health have the control of the expenditure for horses, carts, etc., used for removing ashes, offal, etc., from the premises and streets of the city. The Board of Health, consists of three persons, not being members of the Council, who, although paid for their services, have the power of appointing such subordinate officers as they may see fit, including a Superintendent. This officer, however, is only appointed subject to the approval of the Mayor, and has the direct superintendence of the removal of ashes, the cleansing of the streets, and removal of all kinds of refuse. A City Physician is also appointed annually by the Board (subject to approval by the Mayor), who acts as Medical Officer of Health and Public Vaccinator, as well as Medical Attendant to the prison, jail, and the police-stations. There is also a Port Physician, to visit vessels and act as Quarantine Officer. The interment of the dead at fixed charges is performed under the superintendence of the Board of Health. The supervision of the drains and cesspools is entrusted to the Superintendent, and the regulations show the bad sanitary arrangements of the city. Amongst other rules, there is a provision that the privy-vaults are to be made of brick and cement, to contain at least 80 cubic feet, and are not to be opened, except by express permission of the Superintendent, between the 1st of June and the 15th of September in each year. Under the regulations for the sale of fish, none but salmon, shad, flounders, smelts, and other small fish, are allowed to be brought into the city until they have been cleansed of their entrails. Under the heading, 'Infectious Diseases,' the Board is required to make effectual provision for the removal of any person suffering from a dangerous infectious disease, and for preventing the removal of infected beds, bedding, and clothing. There are numerous other regulations, as regards vaccination and re-vaccination; quarantine; hospitals for infectious diseases; removal of nuisances; prevention of offensive trades; the sale of unwholesome and adulterated food; and abatement of overcrowding; which give great powers on these subjects to the officials employed by the Board.

ON THE VALUE OF SULPHUROUS ACID AS A DISINFECTANT.

Such doubts have been thrown on the efficacy of the so-called disinfectants, through the progress of microzoic research, that Dr. Wolffhügel (*Mittheilungen aus dem Kaiserlichen Gesundheitsamte*, Band ii, 1881, p. 183-233), one of the most distinguished of the pupils of Pettenkofer, has undertaken, at the laboratory of the Board of Health at Berlin, a course of experiments, with a view to ascertain the conditions most favourable to, and the limits of, their action; beginning with sulphurous acid. For its production he is inclined to prefer the old plan of burning sulphur, using a little spirit (20 cc. to ½ kilog.), and fixes 20 grammes as the quantity required for each cubic mètre of room space. Theoretically, this will give off CO^2 to the extent of 21 vols. per cent. of the atmosphere. A much larger amount can of course be evolved by the liberation of gas previously condensed to liquefaction, and this method excludes all risk of fire, but in practice the cost is prohibitive. Sulphurous acid, however produced, is far less active in the presence of water; for this reason, and also to prevent loss by diffusion, the walls and ceiling should always be saturated. The same applies to clothes; but here we are met by the objection presented by its bleaching powers. Woollen fabrics absorb it to a far greater degree than linen or cotton, and oil opposes, as water favours, absorption. Under ordinary conditions, it fails to penetrate bales of goods or bundles of clothing, which should therefore be opened and spread out. Dry articles are not appreciably injured by it. Sulphurous acid in the highest state of dilution (0.75 to 1.0 vols. per cent.) speedily destroys the bacilli of splenic fever, the micrococci of putrid blood, and like organisms, if dry in twenty, if wet in two minutes; but on spores it has, whether as gas or in solution, even in the highest concentration, no influence whatever. It would be well, says Dr. Wolffhügel, if we could renounce all such agents, and exclusively employ such as are capable of destroying all organisms, without distinction.

HOW SMALL-POX IS SPREAD.

A recent report of the Medical Officer of Health for Nottingham, narrates the history of the introduction of a case of small-pox into that town, which illustrates how the disease may be, and without doubt, often is, spread. On April 25th, we learn, a poor woman was called from Nottingham by telegram, to see her child who was on a visit at Batley, near Leeds. On arriving at Batley, the mother found her child suffering from small-pox and was, according to her statement, advised by the medical man in attendance to remove it at once. Accordingly, she forthwith proceeded to convey the child home. She took it in a cab to Batley station, and from there went by train to Leeds, at which place she had to sit in the waiting room for about two hours till the train started for the south. She then got into a third-class compartment with two other passengers, one of whom was a sailor on his way to join his ship, and all four travelled together as far as Trent. 'Arrived at Nottingham, the poor woman carried her child all the way up to her house in Windsor Street, which she reached about two o'clock in the morning.' The child was, at this time, in the first stage of a confluent attack of small-pox. The numerous possibilities of the diffusion of the disease afforded in this remarkable journey it is unnecessary to point out.

PRECAUTIONS AGAINST THE SPREAD OF MEASLES

Mr. Harris Butterfield, the Medical Officer of Health for Bradford, where measles is very prevalent, has issued a large poster, in which he states that during the months of March and April, 82 children have died of measles in the borough, and as it is believed that hundreds of children are affected with the disease, which is very infectious, the following precautions should be taken. Children affected with

measles should be kept apart from others who have not had the disease. They should not be allowed to go to school or mix with other persons until infection has ceased, which will be in about four weeks from the commencement of the disease. No child living in a house infected with measles should attend school for at least a month from the commencement of the last case occurring on the premises. Parents and others in charge of children are particularly cautioned not to allow them to enter houses where the disease exists. Mr. Butterfield then points out that it is an error to suppose that measles is a disease to be lightly regarded; the great mortality which has occurred from this cause proves the contrary, and it is therefore of great importance that medical advice should be obtained early in every case. Every house in which there has been a case of measles should be thoroughly disinfected at the termination of the disease. The Bill then gives in full, by way of caution, the section of the Public Health Act, 1875, which imposes a penalty on any person suffering from any dangerous infectious disorder, who wilfully exposes himself without proper precautions against spreading the said disorder, in any public place or public conveyance, without previously notifying to the owner or conductor thereof, that he is so suffering, or being in charge of any person so suffering, so exposes such sufferer; or gives, lends, sells, transmits, or exposes without previous disinfection, any bedding, clothing, rags, or other things which have been exposed to infection, from any such disorder.

VOLUNTARY SANITARY INSPECTION OF HOUSES.

At a meeting recently held in Glasgow, to promote the establishment of a householders' sanitary protection association, Mr. John Honeyman, architect, in supporting a resolution, said he thought he might venture to say on behalf of his professional brethren, as well as on his own behalf, that they did not regard the formation of such associations with jealous or unfriendly feelings, but rather as powerful auxiliaries in promoting much-needed sanitary reforms. For his own part, knowing practically the difficulties which often lie in the way of proper arrangements being devised for house-drainage, and the dangers which arise from bad workmanship and from accidental causes before and after a house was occupied, he thought it was simply impossible to over-estimate the importance of periodical inspection. He was quite certain that if every householder in Glasgow knew as well as he did, how impossible it was to rely upon the sanitary arrangements of a house being faultless at first, or continuing to be so, the prospectus of the proposed association would not be many days published till its membership would be reckoned by thousands. A hope had been expressed that the operations of such associations would lead up to the establishment of compulsory inspection by Government or Local Authorities; but he sincerely hoped that they would have no such result, and that they would rather do away with any excuse for such official interference. He was a believer in a doctrine which seemed to be getting rather out of favour of late, that the worst thing you could do for a man—the surest way to debase him, and to make him worse in every respect—is to do for him what he is perfectly able to do for himself, especially when it is clearly his duty to do it. Surely it would be infinitely better to aim at arousing an intelligent interest in such a subject as this, so much affecting a man's own well-being and that of those nearest and dearest to him, and to stimulate to manly, independent action. Undoubtedly, one of the most important results of the establishment of such associations would be their educational influence. This would very speedily be felt. Architects who might not have given the subject so much study as it deserved—and he feared there were such—would see the expediency of guarding against errors which the first visit of the inspector of the association would disclose. Contractors would certainly become more careful to avoid defective work, while householders would find themselves wonderfully enlightened after perusing the inspector's first report; and this increased knowledge would certainly produce most important results.

SANITARY PROGRESS IN SPAIN.

The Spanish Government has lately submitted to the Senate and Cortes a new bill for the formation of a 'Royal Council of Health'. This Bill is a very comprehensive one, and has, according to the Spanish medical journals, caused considerable dissatisfaction in professional circles, owing to its strong centralising tendency, and also to the great preponderance on the board of lay over medical members. The Bill proposes to deal, by means of a council or *junta*, with all questions touching public hygiene, whether by sea or land, and also with the formation of a corps of health police. It is to be the supreme authority in all these matters. The wide extent of the powers with which it is proposed to endow this body may be gathered from a few of the clauses of the bill now before the Senate. The council is, according to Art. 1, to decide on any reforms necessary in the organisation or management of the sanitary police, especially as regards questions affecting foreign countries. It is to decide (Art. 2) on the establishment of a regular corps of house sanitary police, destined to study and check the spread of epidemic and epizootic diseases. Art. 3. The council is to exercise supervision over the various branches of the healing art (*sic*) and over the mineral spas; (Art. 4) and also over the sale of medicaments and poisons. Among other instructions the council is directed to investigate the best plans of construction for hospitals, charitable and public institutions, and also private houses; to exercise a sharp inspection over medico-pharmaceutical matters generally, and to investigate the causes of infant mortality. This programme is a pretty extensive one, and none the less so, in that out of the forty-three members composing the Council, only three are to be medical men.

The new Spanish Society of Hygiene was inaugurated on the 23rd of April by the King in person, attended by several of the ministers and great officers of state. On the occasion of the first session, which was held in the Hall of the University, Dr. Señor Mendez Alvaro opened a discussion 'On the Causes of the Excessive Mortality of Madrid'. These he traced in part to the scandalous condition, from a sanitary point of view, of the common lodging-houses and tenement buildings in the city. He also called attention to the fact that the garments of persons dying in the general hospitals were, as a rule, sold by dealers at public auction, without any precaution as to the nature of the disease from which the owner died, or of disinfection having been taken. He criticised severely the indolence and apathy displayed by the municipal authorities on these important matters. Senator Don Josè Galdo followed, and emphasised the last speakers remarks by a short review of the conduct of the authorities of Madrid

on the occasion of the last visit of yellow fever to that city. The Society at this sitting also took official cognisance of an exhibition of scholastic materials shortly to be inaugurated. Simultaneously with the inauguration of the Society of Hygiene of Madrid, the first number of a new sanitary journal, the *Boletin de Higiéne*, has appeared. The object of this journal, as its name imports, is to diffuse the knowledge of sanitary science, and to keep its readers abreast of the latest advances in this subject. The first number contains articles on the best methods of dealing with epidemics and of detecting and checking food adulteration.

AN AMERICAN REMEDY FOR BABY-FARMING.

A paper on the Work and Methods of the Nursery and Child's Hospital of New York City, of which a summary is published in the Charity Organisation Reporter, contains some interesting details of work in a difficult direction. The work was commenced in 1854, and was the fruit of a private inquiry into the condition of the children of wet nurses, boarded at such places as the mothers' means commanded. The inquiry showed that, with scarcely an exception, they died within a year. In one week after the house was opened every bed was filled with the children of wet nurses, in extreme conditions of emaciation and want. The number of sick children brought to the house necessitated an extension of accommodation, and, after securing a grant from the State Legislature, a new hospital was erected in 1857. Originally the managers of the hospital refused to receive foundlings or illegitimate children. During the civil war, however, their views changed, and after its conclusion the building was thrown open to illegitimate children and their mothers. The criminal reports showed a marked decrease in the number of suicides and infanticides as soon as this concession had been made. In 1870 a country branch of the nursery was opened. Those who are entitled to benefit by either of these departments consist of women about to be confined or with infants, and destitute or deserted children under four, who may remain to the age of eight. No child can be received whose mother (if known) refuses to contribute to its support. Village homes are chosen for children above four years. The mothers of children born in the institution remain with them three months at least, each nursing her own child and another. If they then desire to leave, they pay part of the board of their children, and are encouraged to visit them. Some prefer to remain, and eventually become caretakers of cottages. In the City Hospital two ladies of the management are appointed for each week, and visit the hospital daily. In 1856, the first year of the nursery, there were 267 children in charge, and in the last year, ending March 1882, 1,550 children. In 1880 the expenses for both branches was 130,902 dollars, of which the institution contributed 20,000 dollars. The cost of maintaining each inmate is about 66 dollars; 10 dollars per month is paid for the board of those in private families, and the city *per capita* allowance is 38 cents per day.

ARTIZANS' DWELLINGS IN NOTTINGHAM.

A Bill to confirm a provisional order of the Local Government Board, under the provisions of the Artizans' and Labourers' Dwellings Improvement Act, 1875, relating to the borough of Nottingham, has been put before Mr. Charles Frere, one of the examiners of the House of Commons, for the purpose of complying with the standing orders. The scheme to which the provisional order applies is described in the Bill as the Nottingham Improvement Scheme, 1881. The Bill recites, 'That an official representation has been made to the Urban Sanitary Authority that diseases indicating a generally low condition of health amongst the population have been from time to time prevalent in a certain area; and that such prevalence may reasonably be attributed to the closeness, narrowness, and bad arrangement of the streets and the houses within the said area, and to the want of light, air, ventilation, and proper conveniences, or to other sanitary defects; and that the sanitary defects in that area cannot be effectually removed otherwise than by an improvement scheme for the re-arrangement and re-construction of the streets and houses within such area.' The Corporation therefore seek powers to acquire all the lands, houses, and buildings within the area specified, 'and pull down and clear away the materials of such houses and buildings.' The total area to which the scheme relates is 12,813 yards; the number of artizans' dwelling-houses in the area is 104, with about 400 occupants; the total population of the area is 473. The Corporation may, for the purpose of providing accommodation for persons of the working classes displaced by this scheme, appropriate part of the land forming their Bridge Estate; the dwellings to be erected in accordance with the scheme to be well and substantially built, properly ventilated, etc. It is also provided that the Corporation may from time to time deal with parts of the land within the area without being required to purchase and deal with the whole of the lands within the area. The total estimated cost of acquiring the lands and buildings for the purposes of the scheme, clearing the site, constructing new streets and incidental works, is £84,500; the estimated value of surplus lands available for re-sale is £49,000; and the net cost of the Improvement Scheme is put at £35,500. There was no opposition, and the Examiner decided that the standing orders had been complied with, and the Bill in due course will be reported to the House and read a second time.

THE DISINFECTING CHAMBER OF THE STRAND DISTRICT BOARD OF WORKS.

The disinfecting chamber of the Strand Board of Works has lately been removed to Denzil Street, a narrow street near four large schools, one belonging to the School Board, having an average attendance of 550 children. In consequence of complaints made by the clergy and other residents, the School Board obtained the sanction of the Attorney-General to proceed against the Strand Board of Works, not only for erecting the chamber in so close, and therefore, it is alleged, unsuitable place, but also for not having the infected clothes disinfected with sulphur before their removal. It was stated in the affidavits for the plaintiff, that as the men employed in the removal did not wear any linen garments over their clothes while handling the infected clothing which had not been previously partly disinfected with sulphur fumes, they were likely to spread infection amongst the children when they were going to or coming out of school; also, that the chimney was within a few feet of some of the windows in an adjoining street. The inhabitants also complained of injury to health from this cause; and lastly, that generally the disinfecting chamber was a nuisance. Affidavits

were read for the defendants from several Medical Officers of Health, stating that the disinfecting chamber is well constructed; that the truck used in the removal of the clothing is of the best description; and that injury to health during the removal could not happen by spread of infection from the infected clothes. The motion was allowed to stand over, the plaintiffs having leave to inspect the chamber, the defendants giving an undertaking in the meanwhile to partially disinfect the clothes before removal, and also not to bring the infected clothes to the chamber, except before 8.30 a.m., after 8 p.m., and during the hours the children are at school. The difficulty of carrying out the disinfection of infected clothing in crowded neighbourhoods is well shown by this case, but there can be no doubt that although the plan adopted by the Strand Board is that usually employed in other districts, it is not without risk, as the men's clothes are likely to be infected whilst carrying the infected goods from the rooms to the truck, and especially, as after delivering the articles at the chamber, the men are said to visit an adjoining public house in the same clothes. The proposed arrangement will remove much of the risk, and will, it is to be hoped, be carried out in all the other metropolitan and crowded localities, in which it is at present neglected.

LEAD-POISONING ON THE TYNE.

Considerable excitement has occurred in the various towns on the banks of the Tyne, in consequence of the somewhat frequent occurrence of cases of lead-poisoning amongst the hands employed in that industry. At the inquests held recently on the bodies of two female workers, it was elicited, that although the owners of the factories provided proper precautions and remedies against the poison, the hands, as a rule, systematically avoided using them, although such neglect was sometimes attended with fatal results. In cases where the sufferers recovered from the severe effects of lead-poisoning, they showed little hesitation in going back to their former employment, contrary to the advice of their medical attendants. In consequence of the number of cases becoming chargeable to the Gateshead Union, the Guardians have petitioned the Home Secretary to institute an inquiry as to the advisability of employing machinery in the most dangerous stages of the process of lead manufacture. An inquest was held at Jarrow-on-Tyne on the 7th inst., on the body of Mary Campbell, a white-lead worker, recently employed at the Tyne Lead Works, Hebburn, who died on the Sunday previous. Mr. James Henderson, Superintending Inspector of Factories, Glasgow, who is at present making enquiries in the district, relative to the sanitary precautions adopted in lead factories, officially attended the inquest. Mr. Henderson said that he was perfectly satisfied with the precautions adopted by the Company for preserving the health of their *employées*, respirators and baths being provided for them. The weak point was the difficulty of enforcing attention to these precautions on the part of the people themselves, who, unfortunately, were singularly neglectful of their own vital interests. It appeared that some persons were much more susceptible to lead-poisoning than others, and an arrangement had been made amongst the firms of the district, by which a list had been made out of those persons most liable to suffer from the effect of the manipulation of lead, with a view of their being prevented from being employed in such factories, as a matter of self-protection. The jury found that the deceased, who had only been employed a short time in the factory, had died from encephalitis, produced by lead-poisoning, but acquitted her employers of all blame in the matter.

THE PUBLIC HEALTH
DURING MAY 1882.

THE mean temperature last month at the Royal Observatory, Greenwich, was 54°.5, and was 1°.9 above the average May temperature during the 100 years. Excepting a slight deficiency on the 8th and 9th, the mean was continuously above the average during the first thirteen days of the month; during the following seven days ending the 20th, the mean was below the average, whereas an excess prevailed during the last eleven days of the month, except on the 25th and 31st. Thus an excess of temperature prevailed on 21 of the 31 days of the month. The coldest day during the month was the 15th, when the mean was 47°.4, and 5°.5 below the average; the warmest day was the 29th, when the mean was 26°.9, and showed an excess of 5°.1. Rain was measured at Greenwich on eleven of the thirty-one days of the month to the aggregate amount of 1.4 inches, which was 0.7 of an inch below the average May rainfall in sixty-one years. The rainfall of the first five months of this year was 7.4 inches, and 1.4 inches below the average. The sun was above the horizon during 482.1 hours in May, and 237.8 hours of bright sunshine were recorded at Greenwich. The recorded sunshine last month exceeded by more than sixty-nine hours the average amount recorded in the five preceding corresponding months; indeed, it was the highest monthly record of sunshine since June 1877. Northerly and north-easterly winds prevailed during the greater part of the month.

In the twenty-eight large English towns, now dealt with in the Registrar-General's weekly returns, which have an estimated population of nearly eight and a half millions of persons, 28,201 births and 17,113 deaths were registered during the five weeks ending 3rd inst. The annual birth-rate, which had been equal to 37.0, 36 4, and 35 5 per 1,000, in the three preceding months, further declined to 34.7 during May. The birth-rate in May 1881, in the twenty towns then dealt with in the weekly returns, was equal to 35.5, or 0.7 above the rate recorded last month. The lowest birth-rates in the twenty-eight towns last month were 29.1 and 29.2 in Halifax and Brighton, while the rates in the other towns ranged upwards to 40.1 in Birkenhead and 42.7 in Hull. The birth-rate did not exceed 33.1 in London, whereas it averaged 36.2 in the twenty-seven provincial towns.

The annual death-rate in the twenty-eight towns during the five weeks of May averaged 21.1 per 1,000, and showed a further decline from the rates in the three preceding months, which were 26.6, 23.7, and 22.7 respectively. The average death-rate in the twenty towns formerly dealt with did not exceed 20.5 and 20.3 respectively in May 1880 and 1881. The lowest rate of mortality in the twenty-eight towns during last month was 17.0 in Cardiff. The rates in the other towns, ranged in order from the lowest, were as follow:—Birkenhead, 17.4; Derby, 18.1; Birmingham, 18.5; London, 19.0; Leicester, 19.3; Plymouth, 20.0; Norwich, 20.2; Halifax, 20.4; Brighton, 20.5; Huddersfield, 20.8; Bristol, 21.1; Leeds, 22.2; Sheffield, 22.2; Hull, 22.7; Sunderland, 23.0; Salford, 23.0; Wolverhampton, 23.2; Nottingham, 23.8; Newcastle-upon-Tyne, 24 0; Bradford, 24 5; Portsmouth, 25.0; Oldham, 25.0; Blackburn, 25.5; Liverpool, 25.7; Bolton, 26.6; Manchester, 26.9; and the highest rate during the month was 28.6 in Preston. The death-rate did not exceed 19.0 in London, whereas it averaged 22.9 in the twenty-seven provincial towns which have an aggregate population somewhat exceeding that of London. We have again to call attention to the high death-rates main-

tained in the large towns of Lancashire. Excluding Salford, where it did not exceed 23.0, the rate in each of the six other Lancashire towns included in the Registrar-General's present list was equal to or exceeded 25 per 1,000, and ranged upwards to 28 6.

The 17,113 deaths, from all causes, in the twenty-eight towns, during the five weeks of May, included 973 which were referred to whooping-cough, 718 to measles, 355 to scarlet fever, 237 to diarrhœa, 230 to 'fever' (principally enteric), 98 to diphtheria, and 78 to small-pox. In all, 2,689, or nearly 16 per cent. of the total deaths, resulted from these principal zymotic diseases. These zymotic deaths were equal to an annual rate of 3 3 per 1,000 in the twenty-eight towns, showing a slight further decline from the rates due to the same diseases in the three preceding months. The zymotic death-rate was equal to 3.2 in London, and averaged 3.4 in the twenty-seven provincial towns. It ranged in these provincial towns from 0 6 and 1.4 in Norwich and Huddersfield, to 4 8 in Bradford, 5.3 in Preston, 6.6 in Portsmouth, and 7.7 in Bolton. Epidemic measles was the main cause of the excessive zymotic death-rates in the four last-mentioned towns.

Whooping-cough was again, during May, as it had been in each of the five preceding months, by far the most fatal zymotic disease in these English towns. The annual death-rate from whooping-cough, however, which had been equal to 1.78, 1.44, and 1.31 per 1,000 in February, March, and April, further declined to 1.20 during May; in the corresponding month of 1881 the death-rate from whooping cough in the twenty large towns then dealt with did not, however, exceed 0.56. The highest death rates from whooping-cough during last month in the twenty-eight towns under notice were 1.5 in London, 1.6 in Manchester, and 2.6 in Bristol. The death-rate from measles, which had steadily increased from 0.77 to 1.03 in the first four months of this year, declined last month to 0 89 per 1,000. The highest death-rates from this disease in these towns during May were 3.5 in Bradford, 4.3 in Portsmouth, and 4.8 in Bolton. The rate of mortality from scarlet fever averaged 0.44 in the twenty-eight towns, and was slightly lower than the rate that prevailed in either of the two preceding months; it was, however, somewhat higher than the rate from the same disease in May 1881, which was equal to 0.40 per 1,000. The highest death-rates from scarlet fever during last month in these towns were 1.8 in Hull, 1.6 in Nottingham, and 1.0 in Brighton; 27 more fatal cases of this disease were recorded in Hull during May, raising the number that has occurred within that borough since the 1st July last to 831. The deaths referred to 'fever', principally enteric, in the twenty-eight towns last month, were 230, of which but 75 occurred in London, and 155 in the twenty-seven provincial towns, the aggregate population of which only slightly exceeds that of registration London. The death-rate from fever averaged 0.28 per 1,000 in the twenty-eight towns, against 0.34 and 0.32 in the two preceding months of March and April; in May 1881, however, the death-rate from 'fever' in the twenty towns did not exceed 0.23 per 1,000. The largest proportional fatality of fever during last month was recorded in Liverpool and Sunderland. The rate of mortality from diphtheria in the twenty-eight towns was equal to 0.12 per 1,000, and was lower than that recorded in any month since September 1881. The 98 deaths from this disease in these towns included 64 in London, 7 in Portsmouth, 4 in Leeds, and 3 in Brighton. The death-rate from this disease in Portsmouth, which had been 3.5, 1.7, 1.5, and 1.3 in the first four months of this year, further declined during May to 0.6 per 1,000, a lower rate than has prevailed in any month since February 1881. During the five weeks of May, 78 deaths from small-pox were registered in the twenty-eight towns, equal to a rate of 0.10, which showed a slight decline from that prevailing in recent months. Of these 78 deaths, 48 occurred in London, 8 in Nottingham, 5 in Leeds, 3 each in Bolton and Manchester, 2 each in Birmingham and Newcastle-upon-Tyne, and one each in seven other towns. The fatal cases in the provincial towns showed a further considerable increase upon recent monthly numbers. Judged by the returns of the Metropolitan Asylums Hospitals, the prevalence of small-pox in London continues to decline. The number of small-pox patients under treatment in these hospitals, which had steadily declined in the three preceding months from 490 to 321, further fell during May to 272 at the end of the month. The average weekly number of new cases admitted to these hospitals, which had fallen from 84 to 48 in the first four months of this year, was 45 during May. The proportional fatality of small-pox in the Metropolis, during May, showed the largest excess in the south group of districts.

The rate of infant mortality, measured by the proportion of deaths under one year to births registered, averaged 144 per 1,000 in the twenty-eight towns during May, against 155 and 153 in the two preceding months. This proportion of infant mortality did not exceed 128 per 1,000 in London, whereas it averaged 157 in the twenty-seven provincial towns, and ranged from 93 and 98 in Birkenhead and Cardiff, to 183 in Bristol, 191 in Manchester, 207 in Preston, and 210 in Blackburn. The continued large excess of infant mortality in the Lancashire manufacturing towns urgently calls for local attention.

The death-rate from diseases of the respiratory organs, judged by the Metropolitan returns, showed a further decline during May from the rates prevailing in the preceding months of the year. The average weekly number of deaths referred to these diseases in London, which had been 739, 435, and 342 in the three preceding months, further fell to 249 in May. This number was 52 below the corrected weekly average in the corresponding months of the last ten years. The annual death rate from these diseases in the Metropolis, which had been equal to 9 9. 5 8, and 4.6 per 1,000 in the three preceding months, further fell to 3.3 in May. The annual death-rate from the same diseases during last month was equal to 6.2 in Liverpool, and 4.2 in Salford.

The causes of 428 deaths in the twenty-eight towns during the five weeks of May were not certified, either by a registered medical practitioner, or by a coroner. These uncertified deaths were equal to 2.5 per cent. of the total deaths registered, which slightly exceeded the proportion prevailing in the two preceding months. In London the proportion of uncertified deaths did not exceed 1.1 per cent. whereas it averaged 3.5 in the twenty-seven provincial towns. The smallest proportions of uncertified causes of death were 0.0 and 0.7 in Birkenhead and Plymouth, whereas the proportion ranged upwards in the other towns to 6.8 in Halifax, 7.2 in Hull, and 8.1 in Salford.

Among the population estimated to be living in the outer ring of suburban districts around London, consisting of little less than a million persons, the annual death-rate from all causes, during May, was equal to 16 0 per 1,000, showing a decline of 1.8 from the rate that prevailed in the preceding month. The annual death rate from the principal zymotic diseases in these suburban districts, which had risen from 2.0 to 3.2 per 1,000 in the first four months of the year, declined last month to 2.7. During the five weeks of May, 11 fatal cases of small-pox were recorded in the outer ring, of which 6 occurred in West Ham. Whooping-cough was also exceptionally fatal.

Mr. Francis George Heath has accepted the Editorship of the *Journal of Forestry*, the new volume of which, just commencing, will give considerable space to all subjects interesting to lovers of the country.

The Leek Improvement Commissioners and Urban Sanitary Authority have increased the salary of Mr. Charle Henshaw, the Clerk, by £20 per annum.

Madame Casimir Ladreyt, is the authoress of the Péreire Prize Essay, 'On the Suppression of Pauperism'. The closed envelope sent with the essay contained the motto of the essay without any signature. M. Camille Sée, President of the Commission, has since received a letter from Madame Ladreyt, informing him she preserved an incognita, fearing that her sex, if known, might militate against her success in the competition.

SPECIAL REPORTS.

THE AWARDS OF THE SMOKE ABATEMENT EXHIBITION.

THE following is the further Official List of Prizes awarded by the Committee of Experts connected with the National Health and Kyrle Societies' Exhibition of Smoke-Consuming Apparatus recently held at South Kensington and Manchester. A further detailed Illustrated Notice appears at page 515.

OPEN GRATES FOR BITUMINOUS COAL.

Brown & Green (Underfed Grate) ..... *Gold Medal.*
Clark, Bunnett, & Co. (Ingram's Grate) ..... *Silver Medal.*
E. H. Shorland (Manchester Ventilating Grate) *Silver Medal.*
E. R. Holland (Underfed Grate)..... *Bronze Medal.*
H. E. Hoole (Radiating and Reflecting Grate, with Side Hopper)..... *Bronze Medal.*
M. Feetham & Co. (Basket Dog Grate) ..... *Bronze Medal.*
J. M. Stanley (Hopper-fed Grate) ..... *Bronze Medal.*
T. E. Parker (Vencedor Grate)..... *Bronze Medal.*
W. I. Henry (Smoke Filtering Appliance)... *Bronze Medal.*
Doulton & Co. (Tile Grate)..... *Hon. Mention.*
Rosser & Russell (Grate) ..... *Hon. Mention.*
Geo. Haller & Co. (Kohlhofer Hot-air Stove)... *Hon. Mention.*

OPEN GRATES FOR SMOKELESS COAL.

Coalbrookdale Co. (Kyrle Grate)..... *Silver Medal.*
Yates, Haywood, & Co. (Ventilating Grate) *Silver Medal.*
Michel Perret (Grate) ..... *Bronze Medal.*

CLOSE STOVES FOR BITUMINOUS COAL.

C. B. Gregory (Stove)..... *Silver Medal.*
Jno. Cornforth (Little Wonder)..... *Silver Medal.*
R. W. Crosthwaite (with Gregory's improvements)... *Silver Medal.*
J. F. Farwig & Co. (Stove) ..... *Bronze Medal.*
James Dunnachie (Stove) ..... *Bronze Medal.*
Rev. H. J. Newcome (Stove) ..... *Hon. Mention.*

CLOSE STOVES FOR SMOKELESS FUEL.

W. Barton (Stove) ..... *Bronze Medal.*
F. Lönholdt (Stove) ..... *Bronze Medal.*
Musgrave & Co., Limited (Stove) ..... *Bronze Medal.*
H. J. Pizon (Stove) ..... *Bronze Medal.*
Harry Hunt (Stove) ..... *Bronze Medal.*

KITCHENERS.

T. J. Constantine ..... *Silver Medal.*
Eagle Range Co. ..... *Silver Medal.*
Radiator Range Co. ..... *Silver Medal.*
Brown & Green, Limited ..... *Silver Medal.*
Falkirk Iron Co. ..... *Silver Medal.*
Newton, Chambers & Co. ..... *Bronze Medal.*
W. Stobbs ..... *Bronze Medal.*
M. Feetham & Co. ..... *Bronze Medal.*

A meeting, of which due notice will be given to the exhibitors, will take place at Grosvenor House on or about the 15th of July, when the medals awarded to the successful competitors at the Smoke Abatement Exhibitions at South Kensington and Manchester, will be distributed by His Grace the Duke of Westminster.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this society was held on Friday, May 19th, Dr. J. W. TRIPE, President, in the chair.

The following report was received from the council on the subjects referred to them at the last meeting: First, that they had not concluded their consideration of the necessity for altering the mortality tables compiled by the society in consequence of the recent alterations in the tables of the Registrar-General, and that they had adjourned the *further consideration* of this subject until the next council meeting in June; secondly, that they recommended the society to forward to the president of the Local Government Board a copy of the resolutions passed by the society on April 21st, concerning the supervision of dairies and milkshops by local sanitary authorities; and also to forward to Mr. Fosbroke, President of the Birmingham and Midland Association of Medical Officers of Health, a copy of the letter accompanying it.

Mr. T. S. H. Jackman, Medical Officer of Health for Hornsey, was elected a member of the society.

Mr. C. H. W. Parkinson, Medical Officer of Health for the Wimborne and Cranborne districts, was nominated as an extra-metropolitan member of the society.

Notification of Infectious Diseases.—Letters were read on this subject from Dr. Farquharson, M.P., and Mr. Hastings, M.P., the latter stating that it was his intention to strike out the clause which makes it doubtful whether the Metropolis is included in the measure.

The Alteration in the Tables of the Registrar-General.—A letter was read from Mr. Noel A. Humphreys, enclosing a detailed copy of the amended system of nosological classification in accordance with which the causes of death in England and Wales will in future be abstracted and tabulated for publication in the Registrar-General's annual reports.

ON THE ADMINISTRATION OF THE PUBLIC HEALTH ACTS IN RURAL DISTRICTS.

Dr. ARMISTEAD read a paper on this subject. He stated that the present administrative bodies and their officers were created by the Act of 1872, and no change was made in the 1875 Act, notwithstanding the wise counsels of those experienced in the working of the 1872 Act, and the strong recommendations from the joint committee of the British Medical and the Social Science Associations. He mentioned the difficulties which medical officers of health had to contend against in the performance of their duties and insecurity in the tenure of their office. This had been pointed out to the Local Government Board in August last by a deputation from this society and the British Medical Association jointly, which, so far as he was concerned, had already resulted in the fixity of tenure of office in five out of six of his districts; but the appointments were now separated, and the combination had been broken up. He produced a map, showing the haphazard way in which appointments of medical officers of health had been made throughout England, and the salaries paid in each case. About one-half of the rural districts had appointed a resident medical practitioner as medical officer of health, one-fourth had formed combinations of various sizes, and the other fourth had appointed an average of three officers each, some of which were paid wages at a less rate than common scavengers, and are expected to perform the whole of the duties for two or three shillings a week, and make a report to the Local Government Board once a year into the bargain; that for nearly ten years the working of the different systems had been carefully watched, and the only conclusion possible was that medical officers of health can seldom perform their duties satisfactorily unless they are compelled to devote the whole of their time to the performance of their duties, and in order to do this, the Local Government Board, with credit to themselves and advantage to the community, might exercise, more frequently than they have done, their powers under section 286 of the Public Health Act, and compel contiguous authorities in the same county to combine and appoint the same medical officer of health, and so gradually put an end to the present anomalies. He stated that the improvement of cottage accommodation in rural districts has never yet been fairly undertaken, and it is doubtful whether sanitary authorities without state aid can do more than temporize with the matter; but perhaps if the County Government Boards, so much talked about, are ever formed, they might exercise control over these larger sanitary questions in their respective counties. He then referred to the failure of the Public Health (Water) Act, in consequence of the decision of the Local Government Board's legal advisers, which practically limits the

powers of the Act to those places where a supply can be obtained at a total cost not exceeding £8 13s. 4d., contrary to the intentions of Mr. A. Brown, the framer of the Act. Notwithstanding defects in administration, enormous number of filth nuisances had been abated, and there had been a proportionate reduction in the mortality from filth diseases, especially from fever, the death-rate from which had been reduced from ·9 per 1000 to ·5 in the last decade, and about ·3 in the last two years. What had been done is not a tithe of what might be done. Improved cottages for the labouring poor and the abatement of overcrowding would do much to prevent some of the 50,000 deaths which occur every year from consumption. A more complete system of registration of cases of infectious disease, and the provision of hospital accommodation for the isolation of the cases in every district, would be followed by a reduction in the mortality from infectious diseases, especially scarlet fever, which alone has killed about 20,000 of its victims annually. Up to the present time we cannot boast of much progress in these matters. There is no reason why these diseases should not be abolished altogether, by strict isolation of every case. In conclusion, he gave it as his opinion that the tenure of office should be more secure, that county or other large areas of administration should be adopted, and that the officers should be entirely special and without the distractions of private practice.

Dr. PARSONS stated that he thought very much of the probabilities of a combined district holding together depended on the ability of the medical officer of health. He did not think a combined district was necessarily the best. In large districts the question of locomotion was an important one; for instance, in Wales it would be difficult for one man to undertake the charge of a large area, owing to the mountainous character of the country. After pointing out that combined districts were often made irrespective of county boundaries, he dwelt upon the improvement that had resulted during the past ten years from sanitary work, especially in causing a reduction of deaths from enteric fever.—Dr. CHILD thought that it would be advantageous if medical officers of health were poor-law medical officers in their district. He was of opinion that if the inspector of nuisances were a good officer it would not matter if he were not under the authority of the medical officer of health.—Dr. CORNER expressed the opinion that all medical officers of health should for their own protection be under the control of the Local Government Board.—Dr. TRIPE, in noting the fact that whooping cough was still as prevalent as before health officers were appointed, showed that this was due to the early infectiousness of the disease, and to the fact that no precautions were taken to limit it.—Dr. ARMISTEAD briefly replied.

ON THE ESTABLISHMENT OF A HOSPITAL AT NICE FOR THE RECEPTION OF CASES OF CONTAGIOUS FEVER OCCURRING AMONG VISITORS STAYING AT THE HOTELS.

Dr. CHARLES WEST read a paper on this subject. He said that there was a great want of good nurses, and of opportunity for the isolation of cases of infectious disease occurring in hotels. The hotel keepers endeavour to compel any fever patient to quit the hotel, and great difficulty is felt in finding accommodation elsewhere. At his instigation the medical society at Nice and the syndicate of hotel proprietors adopted the proposal to erect a hospital. The cost would be borne by private subscriptions, and it was determined to ask each visitor to contribute one franc to the institution, and thus the sum of £2000 annually would be realised. It is proposed that each patient should have a separate room, and should be attended by his own medical attendant and a separate nurse, and they are also to have one member of their family with them. The management would be vested in a committee, formed of two members of the municipality, in addition to the mayor and prefect. The hospital should consist of a basement, a ground floor, and a first floor: it should have two wings, and a central block for administration, from which the wings are separated by a court or garden, and with which they communicate by a corridor. All the rooms should face south, and each room would have a cubical capacity of 2200 feet. The kitchen and cellars should occupy the basement. Dr. West, in conclusion, pointed out that if the society would express its approval of the scheme it would have a useful effect in urging on the authorities the better provision for infectious cases in Nice. —Dr. TRIPE dwelt upon the advantages that would accrue to the patients from the treatment they would receive in such an institution.—Mr. SHIRLEY MURPHY said that the best evidence that such an institution would be appreciated was to be found in the use made of a number of private rooms in the London Fever Hospital, which were now so freely resorted to that the number would probably have to be increased at an early date.—Dr. CORNER hoped that the authorities of Nice would make provision for those whose means would not permit them to engage a private room.—Dr. THOMAS felt there could be no doubt of the value of such an institution to any community.

The society then adjourned.

THE BOARDING-OUT OF PAUPER CHILDREN IN CORK.

AN inspection of the children boarded-out by the Cork Board of Guardians in the Passage, Monkstown, and Carrigaline district, has lately taken place at the Passage Courthouse. Sixty children assembled to be inspected by the guardians of the electoral divisions in which they are lodged, and presented a healthy, good-looking, and well cared for appearance. There are in the Cork Union 200 such children boarded-out by the guardians, who are disposed of as follows:—Under what is called the Boarded-out Act, the Poor-Law Guardians have power to lodge in private families, at the public expense, all destitute orphans and deserted children under the age of thirteen. The amount usually paid for their maintenance in this manner is—for infants, 13s. 4d. a month, and for children over two years of age, 12s. 2d. a month. The children are to be treated as members of the household into which they are taken, they are to be comfortably clothed and well fed, and sent regularly to school. At first sight, such a system would appear to be one open to much abuse, in which the unfortunate children might be the sufferers, but it is admitted on all sides that, on the contrary, the arrangement works admirably. Sometimes such abuses occur, but very rarely. The children inspected on this occasion undoubtedly presented a healthy appearance. The advantages of the boarding-out system are great indeed. Instead of generating the seeds of sin and laziness in the workhouse, the boarded-out children grow up healthy and strong, with all the homely virtues of decent peasant households; when they arrive at the age of thirteen they are generally adopted by their nurses, or go to earn an honest livelihood as servant boys or servant girls to the neighbouring farmers. In very few cases do they return to the workhouse, and in this they present the strongest contrast to those who have been reared within the workhouse walls; they, too, go out to service, but often return again with some grievance against their masters. They have no wholesome horror of the badge of pauperism, and once out of work they take little trouble to find fresh employment, while at the workhouse they can, by breaking a certain quantity of stones during the day, get regular meals and a good bed. There is no need to tell persons brought up in the workhouse that they are legally entitled to relief if destitute: they have learned that lesson early in youth, and are not likely to forget it as they grow older. The boarding-out system, then, is clearly less demoralising and more economical in the end than any other form of poor-law relief; indeed, it is even said to be immediately less expensive. It is, therefore, the only system that is satisfactory on all sides. A movement is in progress at present to extend the benefits of the system, not only to orphan and deserted children, as at present, but to the children of all lunatic or permanently disabled parents who are destitute. Such a reform of the law would certainly be of the greatest possible advantage. A good deal of money is spent in

maintaining such children in the workhouse, and the best possible results are not attained, while if they were boarded-out judiciously, the relief given, so far from weakening would strengthen in their lives every incentive to industry, self-reliance, and forethought. With that object in view, the Passage Dispensary Committee held a meeting, after the inspection was over and the children had returned to their respective homes, at which the following resolution was passed:—'That the continued success in the system of boarding-out the orphan and deserted children in the workhouse affords much cause for deep and heartfelt thankfulness, and should operate as a powerful and encouraging incentive to the Board of Guardians to have the Boarding-out Act of Parliament extended to all other children in the workhouse whose parents are permanently disabled by bodily or mental infirmity from supporting them.' Mr. W. D'Esterre Parker, Mr. English, and Mr. Mintern supported the resolution, and all present expressed themselves highly pleased with the result of the inspection.

MIDLAND COUNTIES SANITARY OFFICERS' ASSOCIATION.

THE annual meeting of this Association was held a few days ago at the Council House, Birmingham, amongst the Sanitary Inspectors present being Messrs. Deeks and Bolt (Aston), Lowry and Harris (Wolverhampton), Worrall (Harborne), Clarke (Derby), West (Kidderminster), Loach (Handsworth), and Messrs. Carter, Henshall, Knight, and Marrian (Birmingham).

The following officers were elected for the ensuing year:—President, Mr. Wm. H. Worrall (Harborne); Secretary, Mr. Thos. H. Dale (Birmingham); Treasurer, Mr. R. Henshall (Birmingham); Auditors, Messrs. B. Bolt (Aston), and J. Loach (Handsworth); Executive Committee, Messrs. J. Lowry and V. Harris (Wolverhampton), and Mr. N. Deeks (Aston). Votes of thanks were passed to the retiring officers and suitably acknowledged.

The question of superannuation and tenure of office of Sanitary Inspectors was again brought up for consideration. Several letters were read from different sources, including communications from the Right Hon. J. Chamberlain, M.P., President of the Board of Trade, and Mr. Edward Sutton, Assistant Secretary to the Local Government Board. It was explained that efforts had been made to obtain an audience of the President of the Local Government Board, in order that the views of the Association might be fully set forth, and Mr. Sutton's reply suggesting that a representation in writing should be made, embodying the ideas of the Association on the subject, it was decided on the motion of Mr. Worrall, seconded by Mr. Lowry, that the matter be referred to the Executive Committee with instructions to prepare a memorial for presentation to the Local Government Board, and to submit the same to a special meeting of the Association.

THE NATIONAL HEALTH SOCIETY'S PLUMBING COMPETITION.

THE following report on the recent competition following the series of lectures delivered by Mr. Hellyer at the rooms of the Society of Arts, for the National Health Society, has been presented to the Plumbing Committee of that Society by Mr. George Shaw, Examiner and Judge of the work done in the competition. Mr. George Shaw is late master of the Plumbers' Company, and examiner of plumbers' work and zinc and tin-plate work to the City and Guilds of London Institute for the advancement of Technical Education.

REPORT.—'The result of these examinations has been, to prove that a man may be excellent as a practical workman, and yet highly wanting in such knowledge as I consider necessary in a good plumber. This will be seen by the following analysis:—A answers the first four questions tolerably well; No. 5 he omits, and No. 6 is improperly answered. He omits also No. 7 and 8. No 9 is answered fairly well; he *gives sketches* of traps. B answers more or less to the point, but so confused, that I do not think his answers are from personal experience. Nos. 2, 7, 8, and 9 questions are answered unsatisfactorily; his work is very good. C fails to answer any of the questions properly; in lieu of so doing, he gives scraps of what he seems to have read at some time or another. Work very good. D skips the important questions, and but half answers the others; work not very good. E answers questions Nos. 1, 2, and 3 fairly well; the others unsatisfactorily. Work not very good. F answers all the questions very clearly, except No. 7, which he appears to have misunderstood, as indeed seems to have been the case with all the competitors. Work not very good. G answers throughout in a very satisfactory manner, and with considerable intelligence, with the exception of No. 2; work bad. On the whole, the answers are so unsatisfactory, that, under ordinary circumstances, I would not consider that any of the prizes have been merited. But a good deal must be allowed for the novelty of these competitions, and for the absence of such an inducement for workmen to give thought to their trade, and to become able to intelligently express their knowledge in examination papers. Accordingly, hoping for better results in the future, I recommend that B, F, and G be awarded a prize, the two first for workmanship, and the latter for intelligent knowledge of his trade.

'In conclusion, I may remark that, if the present opening competition show an unsatisfactory result, it also proves the great necessity or requirement which exists for their continuance. Highly valuable as "rule of thumb" efficiency in workmanship undoubtedly is, it merely represents past thought and knowledge, so that the workmen of to-day may be actually inferior in intelligence, while not superior in actual workmanship to the past generation of artizans, who attained to the practical knowledge which these "rules of thumb" represent. It is needless to say that it is only by the application of thought and intelligence to his work, that the workman can reach that thoroughness in the knowledge of his trade, which it ought to be the object of every handicraftsman to attain. I apprehend it is for the promotion of this important object, important to us as a nation as well as to our working classes as individuals, that the National Health Society has been established, and I feel assured that it will ere long have a most beneficial effect, and not only attract a large number of competitors to these examinations, but also serve to develop a gradually increasing amount of technical knowledge in the candidates.'

(Signed) GEORGE SHAW.

Messrs. Bolding and Sons, the sanitary engineers of South Molton Street, have fitted up at their warehouse the most complete collection of closets, water-waste preventers, and bath work that we have seen, the whole having water connections, which enables the purchaser to make himself acquainted with the action of each, the nature of the flush, and all that is necessary to obtain a perfect knowledge of the apparatus. One of the most commendable articles shown by the firm is a syphon arrangement, for urinals of automatic action, capable of regulation, by which a flush of water can be discharged at intervals throughout the day, and which can be increased or decreased at pleasure. The bath before alluded to is fitted up with air-chambers, inducing a quick supply and a similar quick exhaust of the waste, and we recommend all buyers of sanitary appliances to pay a visit to South Molton Street.

The Withington Local Board and Urban Sanitary Authority, Lancashire, have increased the salary of Mr. George Evans, the Clerk, from £250 to £300 per annum.

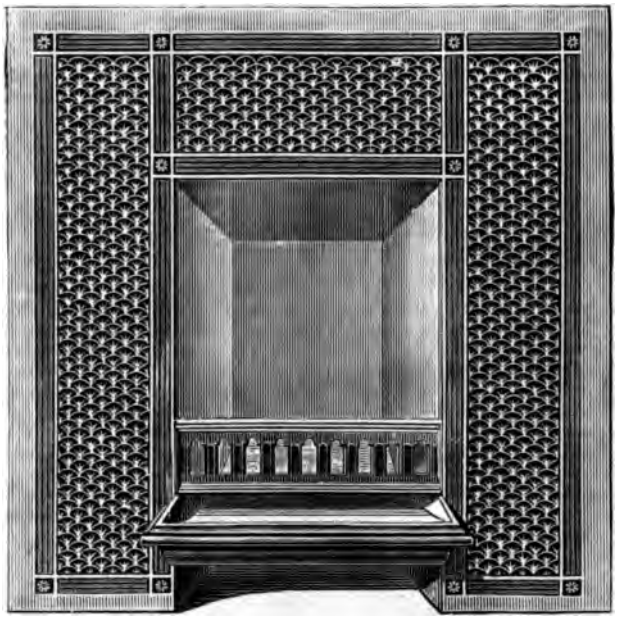
VACCINATION IN SCOTLAND.—The detailed annual report of Dr. Robertson, the Registrar-General for Scotland, containing abstracts of the health statistics for 1878, draws attention to the fact that only four deaths from small-pox are recorded throughout the year. This (adds Dr. Robertson) is 'a most satisfactory circumstance, for which we have no doubt, in a great measure, to thank our excellent Vaccination Act, and the common-sense of our people, which does not dispose them to receive without qualification the statements of the anti-vaccinators.'

DESCRIPTION OF THE PRIZE MEDAL STOVES AND KITCHENERS AT THE SMOKE ABATEMENT EXHIBITIONS.

We are now enabled to publish the results of the various tests at South Kensington and Manchester in connection with the exhibitions of smoke abatement appliances, held at both the places named; and the committee have, we think, arrived at a wise determination in not making any distinction in the value of the awards, wherever granted; that is to say, the successful prize-takers at Manchester are placed on a level with those at South Kensington, and all the medals will bear the impress of the parent exhibition. This is as it should be. In a movement of such importance as to receive the stamp of a national undertaking, it matters little where the exhibition is held, so long as it is under the auspices of the Central Committee, and an individual whose appliance is tested under such circumstances in any part of the kingdom, and is found worthy of a medal, should, in our opinion, be placed in as good a position as to the value of his award, be it gold, silver, or bronze, as if it had been given to him in connection with the first exhibition at South Kensington. The gas awards, and those connected with furnaces, have already been published in these columns; but it is to those relating to coal fire-grates, stoves, and kitcheners, that the greatest public interest undoubtedly attaches itself. This has been unquestionably proved to us by the numerous inquiries from private persons that have reached us during the last three months, asking when the announcements would be made—a convincing proof that numbers are waiting for the juror's decision ere deciding upon the grates or kitcheners they would adopt. They may still be puzzled to some extent, even now the awards are published, as several medals of equal value have been awarded to competing firms for what may be said to be somewhat similar appliances; but they cannot do wrong in purchasing from any of those firms to whom medals have been granted. If asked to explain this apparent anomaly, we must reply that this is not the time to criticise the decisions of the jurors. It would neither be right nor courteous to do so; for when the report of the jurors is published we shall doubtless have reasons assigned for what has guided them in the judgment at which they have arrived. It is at all times an unthankful task to make awards at exhibitions, and we never knew of one in which universal satisfaction was given to all concerned, and we must admit that an almost Herculean task was imposed upon those gentlemen who, without fee or reward, accepted the onerous post of judges in these competitions. This has been a very different process to judging horses or cattle. In manufactured articles, and especially in those in question, much more has to be considered than the uninitiated may suppose, and a grate that may burn well in the hands of its inventor, and even under test, and produce but little smoke, has to be looked at from a different aspect. First and foremost, its mechanical arrangements have to be considered, and what effect they are likely to have when it is in general use and has to be managed by domestics who have not the knowledge, or will not exercise the supervision necessary to assure its successful working. As we have not the means of knowing the reasons that have actuated the judges in their decisions, we must suppose that amongst the multiplicity of appliances brought before them to adjudicate upon, they found several of equal merit, though effecting the desired object by different means. In this we believe we shall find the answer to the question we have raised, and all attempts at criticism must be reserved until we are in possession of the jurors' report.

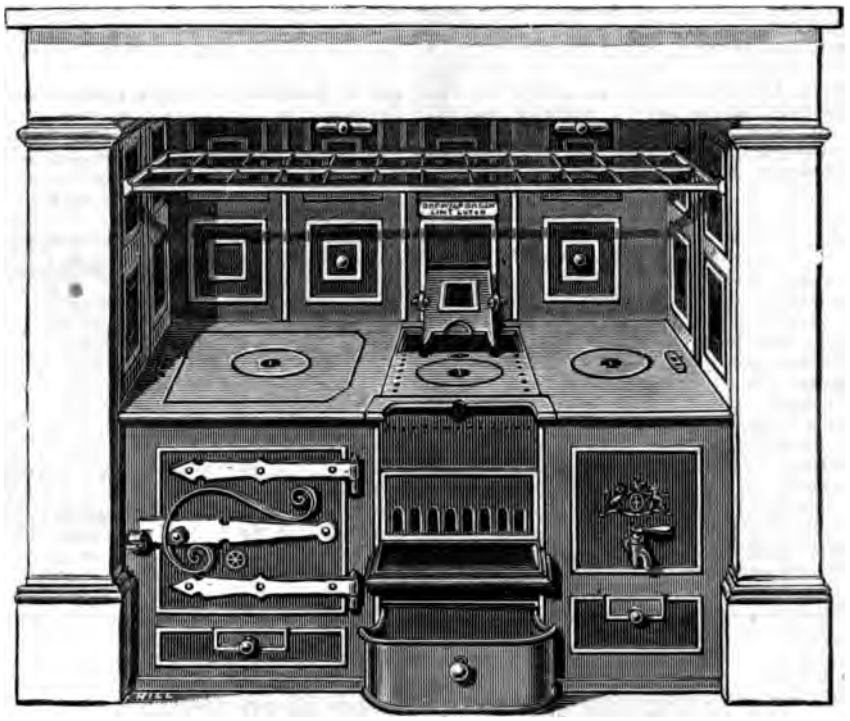
The gold medal of the association (the only one granted to coal fire grates) has been awarded to Messrs. Brown and Green, of Luton, Beds, and Bishopsgate Street, for their 'Kensington' bottom feeding 'Register', for burning bituminous coal, an engraving of which we append.

The Kensington grate is an open fire register, as shown by the accompanying drawing, with an open box or trough in front, as in the 'Luton' smoke-consuming register, and is fed exactly in the same manner by putting the fresh coals in the box and pushing them forward into the fire by means of a hoe-shaped feeder; consequently the burning coals are always at the top, and the gases from the new fuel have to pass directly through the red-hot coals, and are consequently burnt in their passage upwards. The shape of the bottom of the fire basket is circular and not square, as is usually the case in register grates, and it is claimed that this form causes the gases of the fuel to mix more freely with the burning coal, and assists in their disintegration. The shape also admits of a copious supply of air to the burning mass, the combined effect being more perfect combustion, great heating power, and almost absolute freedom from dust. It will thus be seen that the Kensington grate is perfectly automatic in action, and simple in the extreme, while the comparative absence of smoke, and the



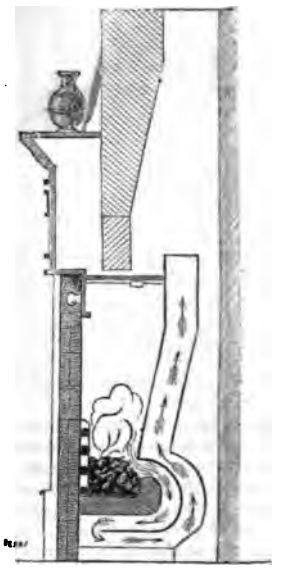
bright fire always-attainable, render it, as the jurors have evidently considered, a grate of undoubted merit.

Messrs. Brown and Green also take a silver medal for their 'Luton' Patent Smoke-Consuming Kitchener as illustrated. This is also a bottom feeder, and in this respect is similar to the 'Kensington' Register. It differs, it will be observed, but little in general appearance from an ordinary close range, excepting that the bars are vertical, flat, and rather short, and that an open tray or box is attached to the front, into which the fuel is placed, and is pushed forward into the fire through a horizontal opening, provided for that purpose below the bars, by means of a hoe-shaped feeder. This is one of the simplest arrangements for bottom feeding that has yet appeared, and its advantages



The 'Luton' Patent Smoke Consuming Kitchener.

are unmistakably apparent. It will be readily seen that nearly all the gases evolved in the process of disintegration of the fuel must pass through the mass of red-hot coal and be consumed ere they can escape, thus materially economising fuel, and utilising all that portion of the heat that, under ordinary circumstances, passes up the chimney

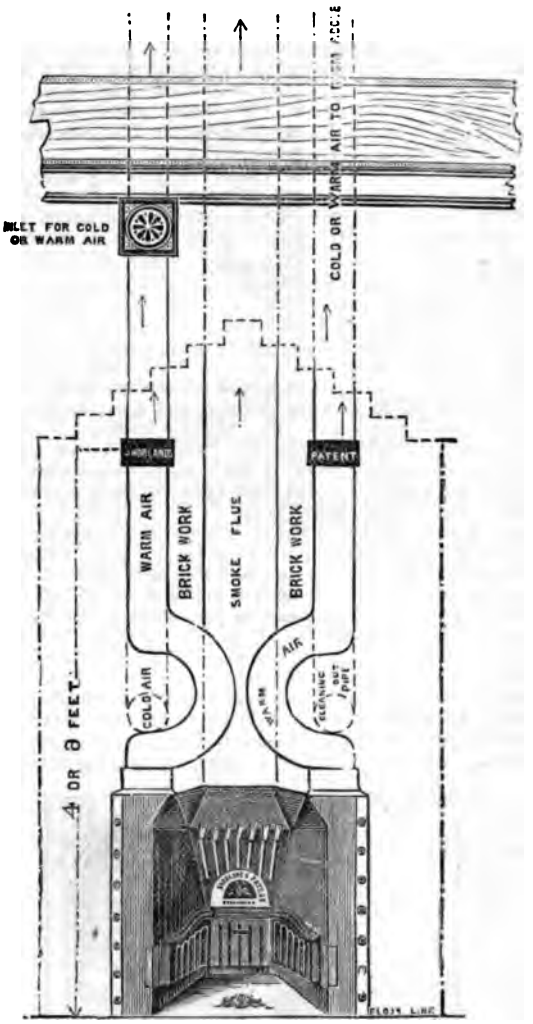


Ingram's 'Kaio Kapnos' Stove.

to waste, in the usual form of smoke. By this method red-hot coal is always on the top, and we certainly appear to have made great progress towards the consumption of smoke in this invention. A number of small holes are provided near the top of the fall-down front plate, and in the sliding plate over the top of the fire, through which a current of air enters, and impinges upon and ignites any inflammable gases that may escape from the fire. This kitchener also burns anthracite coal or coke, and in this case it is fed from the top in the usual manner; but as it is generally admitted that kitcheners are the greatest culprits as regards waste of fuel, the Luton is provided with another means of preventing this waste. A self-acting damper is fitted to the back of the fire, and a sliding plate over the top of the fire; when this plate is pushed back for grilling, etc., it opens the damper, and the products of combustion pass direct to the chimney, and when the plate is pulled forward again over the fire the damper closes, and the heat passes round the oven and boiler. As the heat is consequently usually centred around the range, and giving off its warmth into the kitchen, there is not the inducement to be constantly putting on fresh coal, as it is not burning away with the same rapidity as when it is going up the chimney in a half-consumed state.

Messrs. Clark, Bunnett and Co., 30, Queen Street, E.C., and Rathbone Place, W., are the fortunate recipients of a silver medal for the Patent Kaio Kapnos Stove, which we understand has come out of the test with exceedingly good results. A glance at the accompanying sectional engraving will show the construction of this grate, the bottom and back of which is a fire-clay lump. At about the middle of the fire, or at that height where the coals are universally red-hot, the flue starts, and is carried under the bottom, and so up behind into the chimney. By this means the products of combustion, instead of rising, as they usually do, in volumes of smoke from the top of the fire, descend through it, and are thoroughly consumed, be the fuel coke, anthracite or bituminous coal. If desired, the grate can be used as an ordinary slow-combustion, with smoke ascending in the usual manner, by simply moving a knob communicating with a damper fitted in the flue for that purpose. A chamber for receiving and warming the external air is also provided, and, being fitted with gills, becomes thoroughly warmed before passing into the room. The Kitchen Ranges constructed on similar lines to the above are equally effective.

In the class of open grates for burning bituminous fuel, Mr. E. H. Shorland takes a silver medal for his Manchester Ventilating Grate, a sectional drawing of which is appended. This grate, described in the SANITARY RECORD of February 15th, is based upon the principles of smoke-consumption by means of heated air discharged amongst the products of combustion, and the ventilating and warming of other rooms, either on the same floor or on the ones above, by means of a specially-constructed warm air-back. One great advantage over any other arrangement is that this back is made in one piece of the thickest hematite iron, so that there are no parts to open and close by expansion and contraction, and to admit of sulphurous gases passing into the warm-air chambers, from which pipes carry the heated air to the required spot. The warm air-back can be applied to any existing grate, so that at a comparatively small cost the principle can be effectively carried out in any house, and three or four rooms may be warmed to an agreeable temperature by the one fire. As the fires in two rooms can well be dispensed with under ordinary circumstances, the production of smoke, in a greater or less degree, according to the class of grate that may be fixed in the apartments, is obviated. Mr. Shorland adapts his invention to any kind of stove or heating apparatus, and in connection with the admission of cold air only, without the draught of warm air above described, and of warm and cold air mixed, by means of syphon pipes. The invention has been proved to be a sure cure for smoky chimneys, and there are many thousands of them in use. A channel at the bottom of the fire-basket at the back draws in the air, which is carried around the sides, becoming heated in its passage, and is discharged amongst the gases emanating from the fuel, which it mainly destroys. The back warm-air chamber is simply formed, in one piece, and covers the entire surface of the grate; the air to supply it is, of course, best when brought from the external atmosphere. The hearth on which the patent back is placed warms the air before it enters the self-containing air-tight warm air generating chamber; it then passes up the back and sides, which has seven times as



much surface as that part of the grate against which the fire plays. Two pipes, as shown, carry the heated air from the upper part to the floor above, whence it can be admitted to the room at any height, according to the fancy of the occupant, or, if required to heat a hall, or rooms on the same floor as that on which the grate is fixed, it is sent forward at a lower point; for instance, under the floor line. A strong recommendation of these grates is that they have been largely taken up by the medical profession. Mr. Shorland is a heating engineer of large experience, and his inventions in this direction have proved eminently successful.

Mr. R. Holland, Newington Green, takes a bronze medal for his system of bottom-feeding applied to open fire-grates, for an account of which we must refer our readers to the SANITARY RECORD of the 15th January last.

Messrs. Henry E. Hoole and Co., Green Lane Works, Sheffield, are also the recipients of a bronze medal for their Radiating and Reflecting Grate, with side boxes, or hoppers,

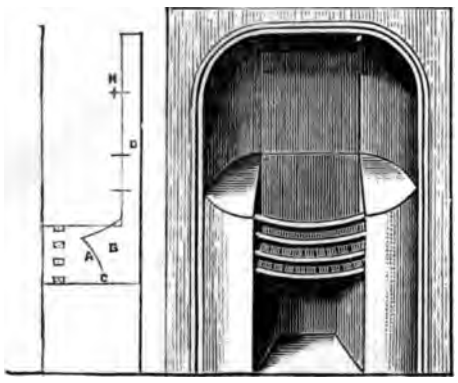
for feeding, to which due prominence was given in the SANITARY RECORD of the last-named date. We believe this grate is capable of giving better results than have yet been attained by it, and that improvements will be introduced into its construction.

Messrs. Feetham and Co. of Clifford Street, New Bond Street, are awarded a bronze medal for a Smoke-Consuming Dog-Grate, described in the SANITARY RECORD of the 15th December last, and another bronze medal for their Kitchener, described in the same number.

A bronze medal is awarded to Mr. T. Stanley of Rhyl, for his patent, applicable to kitchen ranges, open fire-grates, bakers' ovens, &c., which consists in supplying the fuel to the fire by means of a hopper, or coal chamber, which we illustrated and described in the SANITARY RECORD of December 15th last.

Mr. T. E. Parker, Clifton Villas, Prince of Wales' Road, Battersea, is awarded a bronze medal for his 'Vencedor' Grate, to which allusion was made in our report of the South Kensington Exhibition on January 15th.

For appliances other than grates, complete in themselves, intended for the consumption of smoke, by attaching to existing grates, of which only three were exhibited; a bronze medal—the only award—is given to Mr. W. J. Henry of Gibraltar, who exhibited a most simple and commendable arrangement, and which, in our opinion, was worthy of a higher recognition. However, as it is the only award in its class, the recipient is, so to speak, master of the situation. Mr. Henry's invention, which is called the 'Calpean' Smoke Purifier and Soot-Consuming Grate Apparatus, is fitted to the fire-basket at the back; a portion of the back of the grate is removed, and a purifying chamber (so called) is arranged for. The construction of the apparatus is such, that, as may be gathered from the subjoined engraving, a great draught is created in the lower section, and as access to the chimney in the usual direct upward mode is cut off, all the products of combustion have to pass through the fire to the purifying chamber before mentioned. This is filled with metallic shavings which soon become red hot, and, so to speak, create a second fire, which is wasteless and costless, thereby giving increased heat with less consumption of fuel. But the main object of the purifier may be said to be for the purpose that its name implies, viz., purifying or filtering the smoke, which it does, by burning it and



collecting its solid residuum, which after several hours burning will not produce above an ounce or so of a thoroughly burnt or well charred powder. Access to the flue is only obtained by means of an ordinary damper, and by this arrangement perfect control over the fire is obtained, and the smoke, broadly speaking, is entirely consumed. The general adoption of the 'Calpean' smoke-purifier to existing grates should only be a work of very short time. We have just been informed that arrangements have been made with Messrs. Underhill and Co., Stove-Grate manufacturers, of Upper Thames Street, to manufacture the 'Calpean', and the firm intend introducing complete grates in various qualities with this appliance to form a fundamental part, as well as to supply it for fixing to existing grates.

Honourable mention is accorded to Messrs. Doulton and Co., for their tile grates; Messrs. Haller and Co., of Lime Street, for Kohlhofer's Hot-Air Stove; Messrs. Rosser and Russell, Charing Cross, for their revolving grate.

In the section comprising open grates for smokeless fuel, the Coalbrookdale Company, of Coalbrookdale, Shropshire, are awarded a silver medal for their 'Ironbridge' Controlled Combustion Grate, with the new patent 'Kyrle' fire, for burning anthracite coal, which we described at length in the SANITARY RECORD for May. This fire has recently received further improvements, which tend to make the burning of bituminous coal, as well as anthracite, a complete success, to the minimising, if not the entire abolition, of smoke. Like its original, it is lined entirely with fire-clay, and, the bottom being solid, the draught is through the front bars by a narrow horizontal opening at the bottom of the fire-brick back, along its entire length, into a back flue. Passing upwards, the external air is drawn in over the top of the fire, through a narrow slit between the back brick and a deflector brick fixed above it at an angle. This external air, mixing with the gases arising in the back flue, assists in their combustion, and in burning the gases, we minimise, if not altogether destroy, the smoke. The heated gases, before they escape into the chimney, have to pass between two fire-bricks, the lower one of which is the deflector brick we have referred to. The space between the two bricks is divided into cells by thin vertical partitions of fire-brick; thus the products of combustion pass into the chimney in an ignited gaseous condition, which is demonstrated in the grate in question by a mica screen fixed in front of the cells, giving the appearance of a double fire. It is claimed that there are no extraordinary flues, no dampers, valves, or loose parts to get out of order. All the bricks are fixed from the front, and can be replaced at any time readily. The whole of the fire-place being of fire-brick, and the flues also, the fire and ignited gases, acting upon the bricks, raise them to a high temperature, and they again react by radiating their heat back upon the fire; and as it burns either the ordinary house coal, anthracite coal, or the now unused gas coke, and since nearly the entire smoke of bituminous coal is consumed—and the thorough radiation of heat, which it effects with any fuel—it necessarily yields a much greater heat value for the fuel consumed than the ordinary grate. The 'Kyrle' principle is adaptable to any of the modern grates at a trifling extra cost.

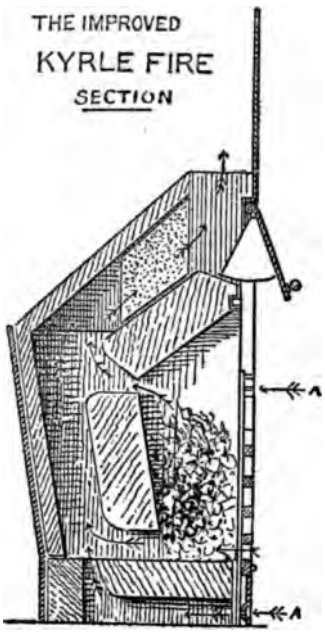
Messrs. Yates, Heywood, and Co., 95, Upper Thames Street, and the Rotherham Iron Foundry Company, Limited, Rotherham, are the only other silver medallists in this class, which distinction is awarded for a new smoke consuming and ventilating grate. We hope to give a description of it in a future number.

M. Michel Perret, Place d'Iena, Paris, is awarded a bronze medal for an open Fire-Grate, composed mainly of fire-brick, described in the SANITARY RECORD of December 15th.

In close stoves for bituminous coal a silver medal is awarded to Mr. Gregory of Beverley, New Jersey, U.S.A., for his Smoke-Consuming Furnace, described in the SANITARY RECORD of December 15th, and Mr. R. W. Crossthwaite of 153, Queen Victoria Street, and Stockton-on-Tees, who has, since the opening of the exhibition at South Kensington, arranged with Mr. Gregory for adapting his patent principle to certain stoves and ranges. At the Manchester Exhibition he introduced several grates with Mr. Gregory's attachment, and ranks as a silver medallist for this improved method. Briefly explained, it may be said to consist in providing means for supplying (and regulating the supply of) air to, and for otherwise obtaining access to the fire-box. Above this, and inclining towards the back, is the combustion chamber, while in the front and at the top is a hopper; in this the fuel, which may be any kind of coal or even refuse matter, is placed. By this means the gases are drawn through the fire, and, for the most part, consumed; but before entering the flue they are met by strong currents of air, heated by having passed around the

fire-box, thus destroying any carbon remaining unburnt. In the original specimen exhibited by Mr. Gregory at South Kensington several talc panes were inserted to show the process of combustion, and its efficiency is beyond doubt.

and without fear of cracking, and as the parts are interchangeable, in case of an accident by breaking, a duplicate can be sent and put in place by any person. The gills also increase the heating surface of the fire cylinder to a very



THE IMPROVED
KYRLE FIRE

The ' yrle' Fire (see page 518).

Mr. John Cornforth, Berners Street, Birmingham, takes a silver medal for his invention for consuming smoke and economising fuel, which is applicable to open grates, close and laundry stoves, and furnaces, and as a complete stove was one of the cheapest shown at the exhibition. The fundamental idea, which is the same in all applications of it, is that the bottom bars are formed of tubes, or hollow bars, the ends of which enter an iron bridge with chambers to receive the heated air from each, which when freed meets the unconsumed gases arising from the fuel, thus attaining almost perfect combuston.

Mr. R. W. Crosthwaite is awarded a silver medal for his Hall Stove, described in the SANITARY RECORD of the 15th December last, with Mr. Gregory's patented improvements.

Bronze medals for stoves burning bituminous coal are awarded to Messrs. Farwig and Co., Queen Street, Cheapside, for George's Patent Calorigen, which is so well known as to need no further comment at our hands, and to Mr. Dunnachie of the Glenboig Fire-Clay Works, N.B., for a new stove composed mainly of fire-brick, with an ornamental shell or casing of cast-iron, and described in the SANITARY RECORD of January 15th.

Honourable mention in this class is awarded to the Rev. H. Newcome for a close stove for the same kind of fuel.

Mr. W. Barton, Boston, Lincolnshire, also receives a bronze medal for his patent 'Premier' stoves which, as regards their heating properties, embody some meritorious points. They are cylindrical in form, but over the cylinder are placed, one above the other, a series of gilled sections or rings, fitting one into the other by means of tongued and grooved joints. These gills, besides radiating outwards, have a tendency to send it upwards, as they are cast with their angles elevated. The advantage of this arrangement is that the sectional division of gills allows the metal of which they are composed to contract and expand readily, large extent, and the inventor claims that it is not necessary to employ fire-clay for the purpose of increasing the heat.

They certainly give off an intense heat, and for the amount of work they are capable of effecting are moderate in price. They will burn for twelve hours without attention, and the heads or tops are arranged so that the smoke flues can be placed in any position to suit the requirements of the buildings in which they are fixed. An application of the 'Premier' stove that Mr. Barton has found advantageous and economical, is the enclosing it in a brickwork chamber in one room, drawing the outer air to this chamber, which when heated is admitted to the room in which the stove is fixed and to an adjoining one, but this, of course, is only applicable to public buildings; and another is by fixing it in a lower apartment under the same conditions, and carrying the heated air to rooms above. In these features it tends materially to reduce smoke, as one fire may be made to heat two or even three rooms, according to the capacity of both.

In close stoves for smokeless fuel no silver medals are awarded; but a bronze one is credited to Mr. Franz Lönholdt of Frankfort, whose stoves were described, and illustrated, in the SANITARY RECORD of December 15th last; and Messrs. Musgrave and Co., Belfast, are awarded a similar prize for their well known Slow Combustion Stoves, to which we have referred on several occasions.

Mr. Harry Hunt, 117 Newington Green Road, takes the same award for his well known 'Crown Jewel' stove, to

which we have so often adverted in these columns, and now again illustrate.

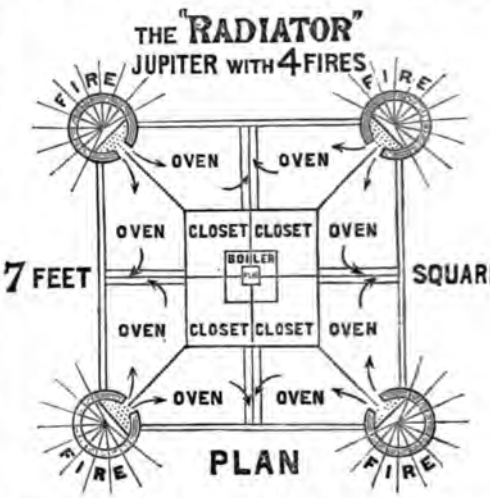
Mr. H. J. Pizon also takes a bronze medal for a 'Close' stove.

For kitchen ranges a silver medal falls to the share of Mr. T. J. Constantine of 61, Fleet Street, whose 'Treasure' Range has become almost a 'household word'. We append an engraving of it, and may remark that it is made in numerous sizes, from the 'Artizan's' or 'Cottager's', standing only 2 feet high and 18 inches wide, to those with double ovens and boiler capable of cooking for fifty persons. The special features of these 'Treasures' are their compact form and the arrangement of the flues, an exhaustive description of them having been given in our Report upon the Medical and Sanitary Exhibition a few months ago. One point, however, then escaped our notice: this consists of a simple arrangement for sifting the ashes as they fall from the bottom of the grate. The small portion of cinders made is then thrown on the fire, where they are burnt, thus preventing any waste. It is only fair to assume that the small percentage of smoke created by the Treasure range has weighed materially with the jurors in granting this award.

The Eagle Range Company of Fleet Street, and Lozells, Birmingham, have been awarded a silver medal for their Eagle Range, to which allusion has been made on several occasions in the SANITARY RECORD, but more particularly in our report of the Smoke Abatement Exhibition at South Kensington on January 15th, 1882.

The Radiator Range Company of Cannon Street, E.C., and Bo'ness, N.B., stand in the category of silver medallists, the range being at once an open and closed fire one, and presents original features in some particulars.

We subjoin a sectional engraving of one of these ranges, named 'Saturn', having four fires, at each of which three joints may be roasted at the same time. By a simple arrangement of sliding doors, the fire can be partially or wholly closed, creating any amount of draught required.



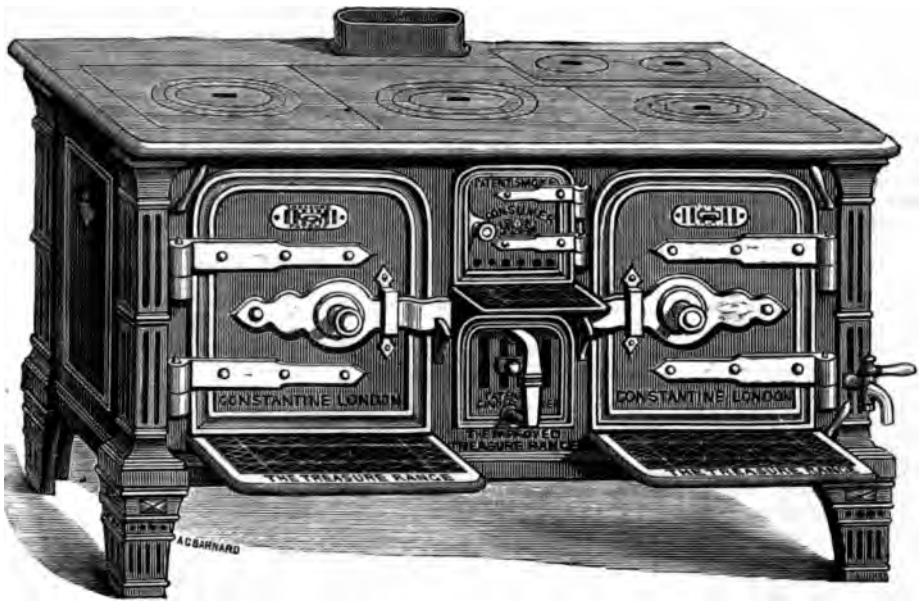
It consumes a large proportion of its smoke, economises fuel, burns coke, bituminous or anthracite coal with equal success, requires no setting, and from its size and shape conduces to economy in building the chimney breasts of new houses where it is intended to be used. The company are also introducing larger ranges. By the peculiar circular shape of the fire-box, three joints may be roasted at one time in front of the fire, and they are adapted for placing in the centre of the kitchen. A four-fire range is capable of cooking sufficient food for a thousand persons—the fires in the range being at the four corners, each roasting three joints, while upon each of the four sides are two ovens, with only one centre flue. Around the flue, and resting upon part of the hot plate are four hot closets; thus giving to the range four fires, eight ovens, four hot closets, one large high pressure tubular boiler, with only one flue: and, if desirable, four independent grill fires can be introduced (similar to the smaller ranges), without in any way interfering with the boiling and stewing operations going on upon the hot plates.

We have already alluded to Messrs. Brown and Green's silver medal for their 'Luton' Kitchener in the early part of this article.

The Falkirk Iron Company of Falkirk, N.B., also take a silver medal for their new kitchener.

Messrs. Newton, Chambers, and Co., the Thorncliffe Ironworks and Collieries, near Sheffield, take a bronze medal for their patent 'Kitchener', which has become generally known as a close kitchen range. They are, perhaps, more adapted for large establishments than for small families, and are most effective in their results.

Mr. Stobbs, the Secretary to the Anthracite Coal Company, Victoria Buildings, Victoria Station, S.W., receives a bronze medal for an American range called the 'Beebe', of which we give an illustration. It burns anthracite coal most effectively. The ovens are made with fall-down doors, that rest at right angles to the front, to enable the contents to be drawn out for examination when required. Their interior is formed in an oblique manner, towards the back of the fire, giving a similar angle to the air-chamber at the sides; and valves regulate the supply as found necessary. A good supply of air is introduced to mix with the gases from the fire, all of which, after passing round the ovens, have also to pass through the fire before entering the chimney. Like all American ranges, the fire-box is small, and consequently burns but little fuel, and the bars are vertical, and are curved at their lower ends, and carried



The 'Treasure' Range (see page 520).

underneath, making front and bottom in one. By removing a covering from the front of the bars, grilling can be carried on under the bottom of the grate; and for emptying the contents of the fire-box, the bars are dropped forward from the front. All the parts of this range are interchangeable,

a most commendable system, which is generally carried out in American stoves, and the other arrangements are all that can be desired.

Captain Douglas Galton, R.E., C.B., F.R.S., has accepted the Presidentship of the Congress of the Sanitary Institute of Great Britain at Newcastle-upon-Tyne. Other arrangements are in progress, and will be reported shortly.

The death-rate of Carlisle for the week ending May 29th was exceptionally high; the rate from all causes being 46 per 1000, and from zymotic disease 16 per 1000.

LAW REPORTS.

Alleged Illegal Condemnation of Imported Meat.

Mr. Wall, who appeared at the Bristol County Court for the plaintiffs, Messrs. Hennessey and Sons, cattle salesmen, of Bristol, claimed damages on the ground that the condemnation of a certain carcase of beef by the defendant, and an order that it should be destroyed, were *ultra vires*, and contrary to, and in excess of, the powers conferred upon the defendant by the Public Health Act, 1875. On the 25th June last, the steamship *Deepdale* arrived at Avonmouth from America, with a cargo of 324 head of cattle consigned to the plaintiffs. The cattle were passed by the Government inspector, Mr. May, and in accordance with the regulations of the Privy Council, the cattle were slaughtered. On June 29th, Mr. Lowick, Bristol, Inspector of Nuisances and Food to the Barton Regis Sanitary Authority, inspected certainly one, if not more, of these carcasses, and having done so, made an order in the following terms:—'June 29th, I have this day inspected a beef carcass, condemned it as unfit for human food, the inside to be buried by the dock company, the carcass to be delivered to Mr. Kent, or the manager of the Clifton Zoological Gardens on first obtaining the receipt, the hide to pass out; signed, William Lowick.' The Act 38 and 39 Vic., cap. 55, sec. 116, provided that any Medical Officer of Health or Inspector of Nuisances might at any reasonable time inspect and examine any carcass, etc., exposed for sale, or deposited in any place for the purpose of sale, or in preparation for sale and intended for the food of man; and if any such animal appeared to such Medical Officer or Inspector to be diseased, unsound, or unfit for the food of man, he might seize and carry away the same, himself, or by his assistant, in order to have the same dealt with by the justices. The 117th section of the same Act said, if it appeared to the justices any animal so destroyed was diseased, unsound, or unwholesome, they should condemn the same, and order it to be destroyed or so disposed of as to prevent it being disposed of for sale or for the food of man. This order was given, though Mr. Hennesey, jun., strongly protested against it. On June 30th, Mr. Dixon, the manager of the Avonmouth Dock Company, allowed the carcass to be delivered to Mr. Hennessey, having previously obtained from him an under-

taking in writing to deliver the carcase to Mr. Kent. The carcase was taken to Messrs. Hennessey's place, and was examined by several veterinary surgeons, who certified to its soundness and fitness for human food. The plaintiffs wrote to the defendant stating that the carcase was at their yard, and asking him to come down and see it, and take some further step in the matter. No reply was received, and no step taken by the defendant.

Mr. Poole submitted on behalf of Mr. Lowick, that he had acted *bona fide* in the interest of the public and the consignee. Without the consent of Mr. Hennessey, Mr. Lowick could not have made the order condemning the meat; the consent was obtained and the order written out. He contended also, under Section 265 of this Act, a member, an officer, or any person acting under the direction of any Local Authority, was not personally liable to any action, claim, or demand whatever. The plaintiffs should have sued the Barton Regis Sanitary Authority. He further submitted that the animal was diseased.

The Judge, Mr. W. Metcalfe, Q.C., said he believed the defendant had acted so as to render himself liable. He made not the slightest imputation on the inspector, Mr. Lowick, but could not help thinking he had exceeded the authority given him by the Act. His departure from the wise provisions of the Act put him outside the protection of the 265th section, which Mr. Poole had quoted. He should give judgment for the plaintiffs for £20 10s.

[This case should put Sanitary Officers on their guard against seizing carcases with the consent of the owners, instead of taking it before a justice to be condemned, under Sec. 116 of the Public Health Act.—ED.]

WATER-SUPPLY.

The East London Waterworks Company, by their secretary, Mr. Elihu Bates, appeared at the Worship Street Police Court in answer to a summons which charged them with having neglected and refused to furnish a supply of water for domestic purposes to a house in High Street, Shoreditch, whereby they had incurred a penalty of £10, and a further penalty of £2 for every day during the continuance of such neglect and refusal. The complainant was proprietor of the Horns Tavern, Hackney Road. The house in High Street had been without water since March 1881, when he went into it. He had applied to have water put on, had complied with all the requirements of the Company, and had tendered payment of rates and expenses for putting on the water. However, the Company would not put on the water, and gave no reason. The complainant found himself obliged to give up the house, which had been closed ever since, thus entailing on him a considerable loss. Mr. Jones, for the Company, contended that, under section 43 of the Waterworks Clauses Act, 10 and 11 Vict., the complainant was bound to make the communication pipes. Mr. Bushby, the sitting magistrate, held that, on the authority of the Sheffield Waterworks case (reported in the SANITARY RECORD, February 15, 1882, page 349), the Company were not liable in penalties until the complainant had restored the communication. The summonses on this ground were dismissed, but a case granted the complainant for the High Court.

DAMP HOUSES.

Taylor *v.* Thompson.

This was an action brought by the builder and owner of a house at Kenley, Surrey, against the defendant, for specific performance of an agreement by the latter to take the house unfurnished for three years. The agreement was entered into in September 1880, and the house was, according to it, to be made ready for occupation on the 11th of October, but was not actually ready until the 27th, in consequence of which the defendant had to take lodgings for a fortnight. The defendant went into possession on the 27th of October, and remained in the house until the 24th of December, when he quitted it, giving as a reason that the house was not habitable in consequence of its damp condition, and alleging that the plaintiff, knowing that he was subject to rheumatic attacks, falsely represented that the house was dry and well built, which the defendant denied to be the case. The plaintiff refused to release the defendant from his bargain, and the latter declined to occupy the house or pay more than the quarter's rent to Christmas 1880. The plaintiff accordingly brought this action, and the defendant counter-claimed for a rescission of the contract and for damages. It was not denied that the defendant had inspected the house on the 25th of September, before signing the agreement, and that he brought down his medical man to assist him in making the inspection.

Mr. Justice Manisty was of opinion that the defendant did not mainly rely upon the representations of the plaintiff, but also upon the judgment of his medical man. He also considered that the plaintiff's representations were true in fact, and that the dampness of the house in December was caused by the omission of the defendant to have defects in the roof and elsewhere properly attended to, and he accordingly gave judgment for the plaintiff, with costs. As, however, the plaintiff had been a fortnight behind the time in having the house ready, an allowance of £5 would be made to the defendant on his counter-claim, with a further £5 for costs.

'BUTTERINE' WITHOUT THE 'BUTTER'.

Six small shopkeepers have been summoned, at Lambeth Police Court, by the Sanitary Inspectors of Lambeth parish, for selling as butter a composition of animal fat; the certificates of the analysts showing that there was no butter in the composition. It was only 1s. 2d. per lb., and the defendants declared that butter could not be purchased for that sum. The composition was made in Holland, and known as 'butterine'. Mr. Chance advised the defendants to ticket the composition 'butterine', and they would not be summoned. Two defendants were fined 20s. each and 12s. 6d. costs; two 10s. each and 12s. 6d. costs; one 2s. 6d. and 12s. 6d. costs; and one, who had been twice before convicted, £2 10s. and 12s. 6d. costs.

SPECULATIVE BUILDERS AND BUILDING BYE-LAWS.

A second batch of summonses (see SANITARY RECORD, March 15, p. 374) have been disposed of by the Hove (Brighton) bench of magistrates, in the cases of Henry Pinker, Walter Pinker, and Henry Marston, all speculating builders of Hove, all summoned for committing breaches of the by-laws for new buildings. The first summons charged them with not solidly putting the walls of certain houses together with mortar; the second summons charged them with disobeying the notice of the surveyor, to desist erecting and to pull down the buildings. The case of the last-named defendant was adjourned for fourteen days to enable him to pull the walls down.

The two other defendants pleaded guilty. In both cases the result of an analysis of the mortar by Mr. Jago, F.C.S., showed the presence of large quantities of loam and chalk. The analysis in one case, gave by measure, these remarkable figures: Gravel and sand, 1.744; carbonate of lime (chalk), 1.275; quick lime, 1 000; loamy earth, 0.951.

Mr. Ellice Clark, C.E., the prosecutor on behalf of the Local Authorities of Hove, proved the cases, and the magistrates fined each of the defendants £5 for disobeying the notice of the surveyor, and 40s. for the bad work. The Chairman of the Bench, Mr. Hurlock, said that builders should know that they were liable to a continuing penalty from the moment the surveyor served them with notice to amend the work.

At Edmonton Petty Sessions, Messrs. Bowitt and Hughes, builders, of Hornsey, have been summoned for contravening Bye-law No. 12 of the Tottenham Local Board of Health in building three houses in Tottenham. Mr. Crowne, clerk to the Local Board, appeared in support of three summonses in respect to three houses erected by the defendants, which were not 'enclosed with walls constructed of good brick, stone, or other hard and incom-

bustible materials, properly bonded, and solidly put together with good mortar, compounded of good lime, clean, sharp sand, or other suitable material, or with good cement, or with good cement mixed with clean, sharp sand', as required by the Bye-law No. 12. Mr. De Pape, surveyor to the Local Board, and Mr. Wilson, surveyor of buildings, gave evidence of the walls not being properly bonded to the end walls, and as to the mortar being totally unfit for use as mortar, there being in it very little lime, and that, evidently, spent lime. The defendants were fined £5 for each of the three houses, with costs.

Sanitary Prosecutions in Birmingham.

At the Borough Police Court, Birmingham, on Friday, May 12, 1882, before Messrs. Richards and Deykin, magistrates, the following persons were summoned by Mr. T. H. Dale, Chief Inspector of Nuisances: Morris Silver of 12, St. Mark Street, for foul drains and defective privies at Maethlu Buildings, in Prescott Street; also for an untrapped drain at 11 in Inge Street. The magistrates made an order in each case for the work to be done in fourteen days, with costs.—The Plating Company, St. Mary's Row, were fined 20s. and costs for a smoke nuisance.—George H. Dugard, Bridge Street West, was fined 40s. and costs.—Frank Parkes, Dartmouth Street, was fined 20s. and costs.—John P. Turner, Snow Hill, was fined 10s. and costs.—Elizabeth Lane, Coventry Road, was fined 10s. and costs.—William Blews, New Bartholomew Street, was fined 20s. and costs.

Water-Rates.

Dobbs v. *the Grand Junction Water Company.*

Mr. Justice Field delivered the judgment of the Court in this case, which came before their lordships on an appeal by Mr. Dobbs, the inhabitant of a house in Westbourne Park, from a decision of Mr. Cooke, one of the Metropolitan police magistrates, when he was called upon to answer a summons for non-payment of two quarters' supply of water to his dwelling-house, and which was charged at the rate of £140 as the annual value thereof, the appellant contending that he was only liable for payment in respect of £118, the net annual value as assessed for poor-rate; while the respondents submitted that Mr. Dobbs should be held liable for the amount of water-rate as defined under the special Acts of the Company from the 7th George IV, cxl, sec. 27, under which water companies were bound to supply a sufficient quantity to inhabitants of private dwellings at certain rates, graduating from £20 to £100, and after the latter amount at a rate per cent. per annum not exceeding £5. After a careful review of the circumstances of the case, his lordship said that the Court was of opinion that the basis of the charge for water-rate was on the net rateable value, and not on the gross estimated rental, and for these reasons they held that the order of the magistrate could not be supported, and that the appellant was entitled to judgment.

BRIEF NOTES OF USEFUL CASES.

Obstruction of Way.

1881. *Baker* v. *Wood.* Obstruction of a public way by a newly-erected building—Defendant ordered to remove the building and restore the passage to its former state. (W.N., 1881, p. 7.)

"Residence."

1870. *Bond* v. *St. George, Hanover Square. Per* Brett, J., adopting the language of another:—"In order to constitute residence, a party must possess at least a sleeping apartment, but that an uninterrupted abiding at such dwelling is not requisite, and that absence, no matter how long, if there be the liberty of returning at any time, and no abandonment of the intention to return whenever it may suit the party's pleasure or convenience so to do, will not prevent a constructive legal residence." (40 L.J., C.P., 47; L.R., 6 C.P., 312; 1 Hopw. & C., 427; 23 L.T., 494.)

Rates.

1881. *Iles* v. *West Ham Overseers.* 59 Geo. III, c. 12, s. 19—This section held not to apply to houses let at a weekly rent amounting to more than £20 per annum. (51 L.J., Q.B.D., 17; L.R., 8 Q.B.D., 69; 46 L.T., 149.)

Liability for Accidents.

1812. *Leslie* v. *Pounds.* Entrance to cellar from highway left uncovered, whereby plaintiff fell into cellar and was hurt—Landlord held liable for negligence of workpeople employed by him to execute repairs to the house. (4 Taunt., 649.)

Rating of Lighthouse.

1882. *Mersey Docks Board* v. *Llaneilian Overseers.* Principle of assessment of a lighthouse:—A fair rent for the ground on which it stands, and a fair interest on the expense of building it. (At Q. Sess.) (46 J.P., 280.)

Recreation Grounds.

1881. *Paterson* v. *St. Andrew's Provost, etc.* Magistrates in the exercise of administrative powers restrained from alienating ground for a permanent road over land held for public recreation. (L.R., 6 App. Cas., 833.)

Street Obstruction.

1881. *Whittaker* v. *Rhodes.* Goods displayed by a tradesman on ground in front of shop which seemed to belong to the footway—Held that there being no proof of dedication subject to the right to display, and no proof of ownership, tradesman was rightly convicted, although he and predecessor had so used the footway for 30 years. (46 J.P., 182.)

Rates.

Rex v. *Ambleside Inhabitants.* If on an appeal against a Rate an error is found which only affects an individual, the sessions should amend the Rate, not quash it. (16 East, 380.)

Appeal against a Rate.

1829. *Rex* v. *Brooke.* Appeal against a Poor Rate on the ground that some party had been improperly omitted—Justices cannot hear such an appeal unless notice, and the ground of it, has been given to the said party. (9 B. & C., 915.)

Rating of Markets.

1816. *Rex* v. *Bell.* A lessee of market tolls in gross not incident to the soil is not rateable. (5 Maule and S., 221.)

Mortuary.

1882. *St. Luke's, Chelsea, Re.* Application for a faculty to erect a mortuary on part of a closed Burial Ground—Mortuary intended to comprise rooms for infectious as well as ordinary cases—Some grave-stones to be interfered with—Application granted, subject to a short delay to enable parties interested in these grave-stones to appear. (*Times*, Jan. 24, 1882.)

Ornamental Ground.

1882. *St. Mary's, Haggerston, In re.* Application, by curate in charge, churchwardens joining, for faculty to convert an old churchyard into an ornamental garden—Approval of Vestry Meeting obtained—Application, being supported by adequate evidence, granted—Some tombstones to be removed, the relatives of persons buried being consulted on the matter. (Consist. Ct. London.) (*Times*, March 21, 1882.)

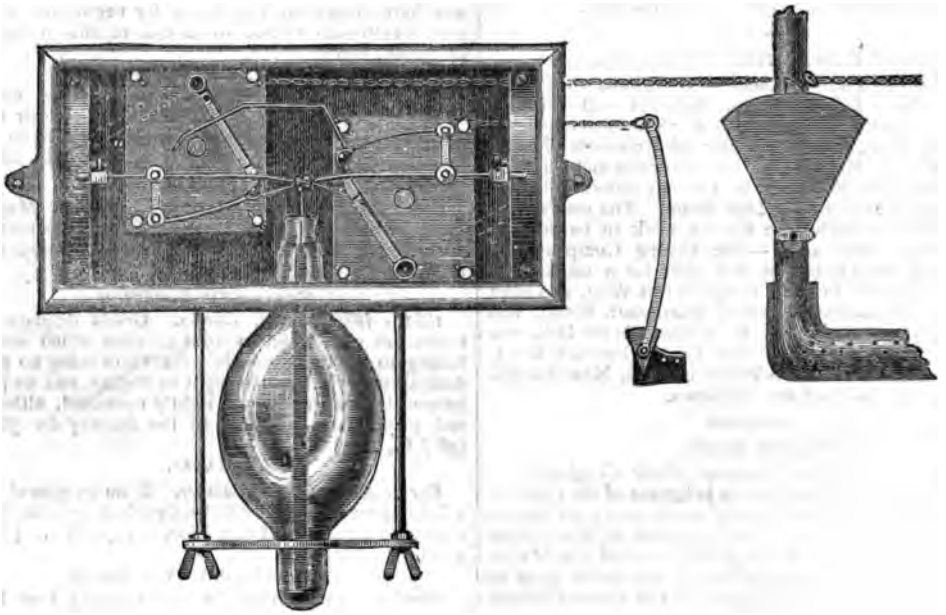
The Prefect of the Paris police has ordered that the following regulations are to be placed on the walls of the Central Market, and all other markets throughout Paris:—Margarine and all similar products offered for sale are to be ticketed as such in a legible manner. It is prohibited to offer artificial butter for sale; offenders will be punished. All suspected produce will be examined by the Inspectors of Markets and the officials of the Municipal Laboratory.

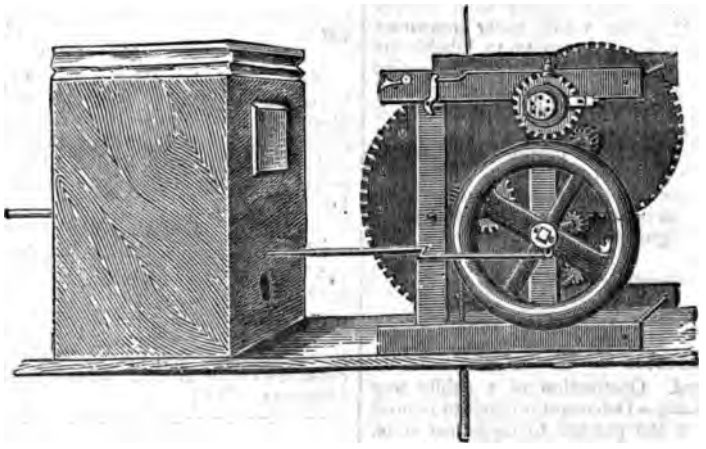
The new German test for petroleum is equivalent to 115 deg. burning test. Refined petroleum for the German market has hitherto been tested at 110 deg. burning point.

SANITARY INVENTIONS.

BRAHAM'S SELF-ACTING FIRE-ALARM.

IN the April number of the SANITARY RECORD we described an ingenious appliance shown in the Miscellaneous Section of the Manchester Smoke Abatement Exhibition, the invention of Mr. W. T. Braham, of 392, Stretford Road, Manchester. We now describe a further development of the idea, and append drawings of the apparatus invented for extinguishing fires, which has been aptly named a 'Self-Acting Fire Alarm'. Although the arrangements of this invention are so simple, and apparently unerring in their action, that it may be carried over an entire house, without a very great outlay, and without disfigurement, we can scarcely expect that it will be largely adopted for general domestic use; but in large and isolated mansions, public buildings, warehouses, theatres, ships, etc., we have no hesitation in saying that the danger of loss by fire, if not entirely annihilated, may be reduced to such a minimum as to render fear for the safety of a building almost unnecessary. Our first engraving represents what we may term the primary mover to stay the work of destruction, which consists of a small box, in which is fixed a glass bulb not unlike an electric incandescent lamp, into which a certain quantity of mercury is admitted. A tube is fitted into this bulb, which nearly touches the bottom, and in this tube is a hollow glass float, which rises automatically when the air in the glass bulb is expanded by heat, and raises a lever which liberates a coiled spring in an adjoining box or barrel. To this is attached a chain or cord connected to a heavy quadrant-shaped iron key, in connection with a tap. We may add that a water-pipe of such diameter as may be considered necessary is carried from the main-supply to any part of a building, around the roof or ceiling (where it may be arranged as a moulding), whence a fire may be expected to break out. This pipe is perforated with small holes to emit a discharge of water. The apparatus may be set to any degree of heat at which a fire may be presumed to raise the surrounding atmosphere, and the action may be thus described. As soon as a fire raises the mercury to the degree at which it has been set, the spring before-mentioned is set free, and acting on the quadrant-shaped key causes it to fall, and rest upon another of much smaller dimensions. This opens the water-way along the perforated pipes, through which the water pours in continuous sprays. But this is not the only safe guard. By means of wires connected with the first-named apparatus, and carried as bell wires to any suitable position, they are connected with the second safety appliance or alarm, which is shown in our

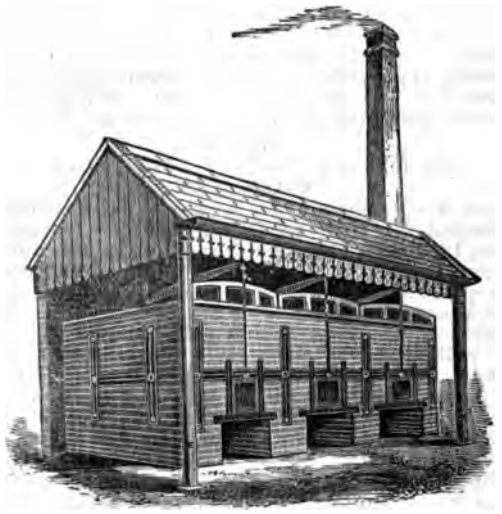




second engraving, and which consists of a simple clock-work arrangement of a few cogged wheels. These being also set in motion, communicate their rotating power to a bellows shown in the square block on the engraving, from the outlet of which, shown by the small tube on the extreme left, is affixed a whistle. The perforated circular disc in the centre of the small cogged wheel is a portion of a chamber like that of a revolver into which cartridges are placed. This chamber is made to rotate, a hammer rising simultaneously with the rotation, the chamber having holes on its horizontal plane also. The hammer falls as each cartridge presents itself over the horizontal hole, and we thus secure, at one and the same time, a copious discharge of water to act upon the fire, a loud report at arranged intervals, and, by the action of the bellows, a constant powerful whistle, both of which denote the danger, a large bell may also be made to ring continuously, and must call attention to the fire. But even further safeguards may be obtained. In the case of a theatre, an asbestos curtain may be connected with the apparatus, and may be arranged to fall with the action of the mercury, and so shut off the fire either from stage or auditorium, and so prevent panics; or an electric wire may be connected with it, and arranged by means of a battery to give intimation of a fire at a considerable distance. Should, however, the fire be extinguished by the means devised before assistance arrives, and the temperature resume somewhat of its former degree, the lever falls, relieving the small quadrant key, which in its turn allows the heavy one to fall a quarter turn, and so shuts off the water. Mr. Braham's invention is so simple, so void of complication, and, from experiments we have seen conducted, so effective, that we believe it only requires to be known to be extensively adopted. Mr. Braham has since introduced a little arrangement, based to some extent upon the fire alarm instrument, for regulating the temperature of a room heated by a gas stove, by which a uniform heat can be kept up by automatic action, and he has also invented a new ventilating and heating stove for gas, to which we propose to advert later on in the season.

PEASE AND LUPTON'S PATENT REFUSE DESTRUCTOR.

THE effectual disposal of street and ash-pit refuse and the garbage from houses which finds its way into the ash-pit, together with the ashes themselves, is a question which of late years has, as most of our readers are aware, become one of anxiety to the authorities, and frequently a great nuisance to the inhabitants themselves. Although not classed with sewage, town refuse certainly follows very closely in its wake, in the difficulties presented as to its satisfactory disposal; and any appliance that will deal with it in an economical and efficient manner, should receive the closest attention of all sanitary bodies. It is generally admitted that a well-constructed furnace offers the readiest means for this object, and such appliances are in use in several districts, but as yet, comparatively speaking, only to a limited extent. First cost, as well as general economy in working, are two most important attributes to be considered in such apparatus, and it appears to us that one of these apparatus that has gained some amount of popularity in certain districts is unnecessarily costly, and that a much less expensive appliance may be found to accomplish the work as efficiently, and at an equally, if not cheaper, rate for its every day use; indeed if what has been placed before us in the shape of figures is correct, and we have no reason to doubt their veracity, this is to be easily attained. These remarks are due to a recent visit we had occasion to make to Bradford, Yorkshire, where experiments have for some time past been carried on with a simple and comparatively inexpensive furnace, the invention of Messrs. Pease and Lupton, engineers, of that town, which has resulted in the inventors having received instructions from the Town Council to erect six of them, notwithstanding that they now possess twelve furnaces of a much more costly character, in another part of the town. The apparatus in question, which we illustrate, consists of a simple furnace built of brick work and lined throughout with fire-brick, in clusters of any number necessary, the drawing depicting three, with a roofing: and it is said that a block of four, with shed and chimney, can be constructed at a cost of from £500 to £600, certainly a most insignificant sum as compared with what the others now in use in Bradford have cost the Corporation. They are fed from the front, as in the case of ordinary steam boilers, and, to use the words of the patentees, they have been specially designed to entirely destroy the noxious fumes generated by combustion. These impinge upon the



top of the furnace, and pass through a hot perforated arch into a combustion chamber, where they are ignited by means of air or air and steam jets, and again passed through cells in the heat trap in their course to the chimney, thus bringing them in close contact with the heated parts of the furnace, raising the temperature of the gases to the destruction of all that is obnoxious. When the furnace door is open for firing or drawing clinkers, the flue is closed; an arrangement which bears very materially upon the efficiency of the destructor. By it cold air is prevented from entering and reducing the heat of the furnace and lowering the temperature of the flues and chimney. This exclusion of cold air keeps all the other furnaces at full work, and, as a result, much more refuse is effectually destroyed. They can also be arranged to exhaust and destroy the noxious gases of main drains or sewers, by connecting them to the furnace and passing the gases through the fire for purification.

Relying upon our observations of the working of a single furnace, we can consistently say that everything put into it (and the refuse in the yard at the time of our visit was of a most heterogeneous character) was rapidly burnt in a most effectual manner, and without the slightest objectionable smell; the heat, which was kept up without trouble, being most intense, and only surpassed by that of a puddling or converting furnace, and the little smoke given off from the stack being no worse as regards odour or colour than from an ordinary coal fire furnace. Apart from the construction of the furnace, the mode of feeding adopted by Messrs. Pease & Lupton differs from that employed in the other system at work in the town, and it is on this the principal difference of opinion exists. Instead of feeding from the top, as in the others, and filling the chamber completely full, and allowing a considerable time for its burning through, the 'Pease & Lupton' is, as we before observed, fed from the front, and in small quantities, at comparatively short intervals, the intense heat quickly reducing the refuse to mere ash, much of which may be utilised for mixing with mortar, etc. In the case of decayed vegetables, putrid meat, or fish, the same plan is carried out, and a valuable charcoal or manure is the result. But to return to the system of feeding. Notwithstanding that a man must be in constant attendance feeding this furnace, experts who have watched it have come to the conclusion

that if worked 135 hours per week without cooling, it will burn as much as two of the others now in use for the same time. We are informed the twelve old furnaces burn on an average 412 loads per week, employing eight firemen and a foreman, whose wages are £12 5s. 0d., giving a cost per load, for labour and burning, of nearly 8d. To this interest on sunk capital must be added, which it is said is nearly 5½d., making a total cost of 1s. 1½d. per load. The estimate for Pease & Lupton's furnace is: men's wages, per load for burning, 4½d., and interest on sunk capital, etc., 1d., or 5½d. per load, being 8d. per load less than the other furnaces; and as it is said there are 665 loads of refuse per week, the saving would be, at this calculation, about £22 per week, or upwards of eleven hundred pounds per annum. Surely this is an invention that is well worth inquiry into on the part of all corporate or sanitary bodies.

DR. SCOTT'S PATENT DISINFECTING CHAMBERS.

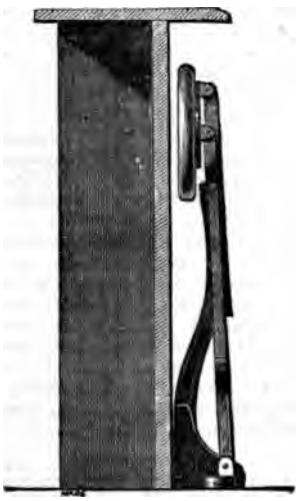
THE War Department have selected and fixed at Herbert Hospital, Woolwich, one of Dr. Scott's Patent Self-regulating Disinfecting Chambers. These chambers have already been described in Mr. Eassie's 'Dictionary of Sanitary Appliances'; but since that time improvements have been added which secured for the patentee, in competition at the recent International Medical and Sanitary Exhibition at South Kensington, the diploma of merit, and other distinctions on the continent. These chambers are manufactured in portable form, of non-conducting materials to prevent waste of heat, and under the patent the heat can be altered or maintained at any temperature required. A brass dial plate having a revolving hand is attached to the patent regulator, so that by pointing the hand to 250°, 270°, or 290°, the temperature rises or falls as desired, and remains steadily at the heat required for any required time. The consumption of fuel is remarkably small; gas or coal furnaces can be used, but gas is the easiest managed and most satisfactory. The sole licensees and manufacturers are Messrs. Maguire and Son, the Dublin Sanitary and Engineering Works, Dublin.

A NEW SMOKE CONSUMER.

A NEW patent for consuming smoke in connection with furnaces, and that, we understand, is also equally adaptable to bakers' ovens—one of the grievances in connection with smoke abatement requiring serious attention—has been recently taken out by Messrs. Brown and Green, of Luton, Beds, and Bishopsgate Street Within, London. We are not in a position to give a detailed account of the invention, which at present is only fixed to the furnaces of the firm at Luton, but we are assured by the senior partner that the consumption (or probably the non-creation of smoke) surpasses anything he has hitherto seen. As soon as the drawings are complete, we shall lay before our readers a full and detailed account of the invention.

RETTIE'S PATENT FOLDING SEATS.

AMONGST the pressing questions of the hour is one which is at the present moment attracting much attention, and of which it is the object of the invention now under consideration to assist in the solution. The hours of labour of that heavily-worked class of women, the milliners and dressmakers, have been shortened and employers are obliged by law to provide them with better appointed work-rooms; but frequently, in the same establishments where the seamstresses are plying their needles, numbers of their sisters, employed from 'early morn to dewy eve', are standing behind the shop counter and, beyond the short time allowed for meals, never have the opportunity of resting their limbs by sitting down. It is to provide a resting-place behind the counter that the demand has arisen. Employers of labour in shops have, we know, a strong aversion to their assistants, male or female, sitting down behind the counter; the small space generally left behind a counter for passing to and fro, is a drawback to the introduction of seats, and unless some pressure from without is persistently brought to bear upon the question, matters *will doubtless* go on as they now are, and the effects on the female system, of prolonged standing, resulting in painful and distressing complaints, will continue to be the rule. As we have already noted, the small amount of room behind counters renders the introduction of ordinary seats incompatible with the requirements of a busy trade, but on the other hand, if it can be clearly proved that the health of the *employées* suffers from this arrangement, steps must be taken to alter it, and if a resting-place cannot be provided under existing conditions, construction must be altered and more room arranged for. The 'Rettie Seat' appears to us to offer a solution of the question as regards the present style of counters. It is decidedly unique, takes up but little room, is a fixture, and when the occupant rises from it, it can be immediately placed in a perpendicular position, and, as the appended drawing shows, it occupies little or no space. These seats may be fixed behind any existing counter with little inconvenience, as a small space may be



left between rows of drawers in which to place them, and when not in use, they are folded as shown in the drawing, and would be entirely within the counter line, so as not to present any obstruction to passers-by. Screwed to the floor, with a fulcrum capable of bearing the heaviest weight,

the seat is instantly changed from a vertical to a diagonal line, by the action of two simple levers, assisted by a coiled spiral spring to ease the change from rise or fall. But little consideration is necessary to convince the most ordinary thinker that the 'Rettie' seat possesses several special advantages, and that its adaptation to the purpose we have dwelt upon is complete. But beyond this it seems applicable to an almost endless variety of uses, and

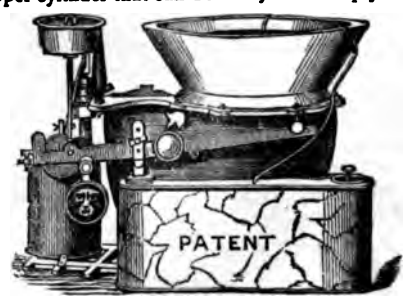
rought into requisition, it has these unques-
ages, that it economises space, and cannot
ıy be upset or turned over. It is already in
s restaurants for the fronts of bar counters,
t one-fourth more persons to be accommo-
n detached stools were in use, and there is
to its adaptation as a substitute for tem-
The 'Rettie' seat is made to any height
juirement, is moderate in cost, and we can
ımmend its use wherever an occasional seat
The offices of the company are at Bush Lane,
E.C.

LIC ROOFING FOR HOUSES.

generally known that metallic roofing tiles
used by the American building trade, which
f tin plates and iron. The former description
in their natural state, the latter painted or
ugh we believe the latter have not as yet
into use, whilst others are coated with metallic
main the metallic roof coverings are of similar
n slates or tiles, and several patents are in
nerica for interlocking or securing metallic
ıe use of nails and screws. As yet but little
been made here in supplanting the time-
ɔr slate with a metallic prototype, though one
ı in this industry have located themselves
ıe articles of which we are about to treat are,
ıglish invention. Thomson and Company, 85,
treet, to whom the introduction is due, appear
d an excellent substitute for tile or slate, in
reous iron plates, which are strong iron sheets,
silicate compound or glass enamel, similar to
:h many of our cooking utensils are coated.
covered on both or only one side, the latter
:ed sufficient for ordinary roofing purposes,
of the enamel can be varied to suit the taste
:t and builder. Skilled labour is not required
ı, and the cost of the plates themselves is
:ent. less than for slates of good quality; the
g forms a part of the patent, and is effected
specially made adhesive material of the most
'acter, nails and screws being entirely dis-
The plates can, if necessary, be bent to
hape without injury, and this can be done
'here they are being used. In addition to the
: mentioned, the metallic tiles possess this
vantage, that the weight is at least one-
an that of tiles or slates, and that when
localities, from the nature of the silica
ıpper chambers of a building will be found
e lowest apartments. Another use to which
ıles have been applied, and that we may fairly
ɔaramount idea in the inventor's mind when
ing them, is for the sheathing of iron ships.
of these vessels with the ordinary copper
al sheathing is simply impracticable, from the
vanic action is immediately set up, and to
governments and ship-building firms are
ng the submerged hulls of vessels cased in
le them to be sheathed with copper, thus adding
cost, besides reducing speed by increased
ɔulk. By means, however, of the adhesive
ɔre alluded to, these vitreous plates can be
ı the greatest ease, and, when once fixed, they
:moved, except by the assistance of hammer
nd so far from this adhesive medium having
effect upon the iron of the ship itself, it has
that it has preservative qualities, and the iron
ıd to be in as good condition when taking off
er long voyages as when the ship was first built.
ırther, and, we must add, remarkable feature
:d by Mr. Thomson's invention, which, to those
he copper or yellow metal sheathing, enables
on iron hulls without the danger of galvanic
set up. The metal is first coated with a sub-
effectually prevents this chemical action taking
.e addition of the adhesive material used in con-
necting or fixing the copper to the iron renders the two so thoroughly non-conducting as to make insulation complete. This fact has been conclusively proved by tests made at the Royal Engineering College, Cooper's Hill, by Prof. McLeod and Mr. Hopps. These gentlemen tell us that the most severe tests to which the compound was subjected by the aid of four powerful and large batteries, assisted by one of the most sensitive instruments known, viz., Sir Wm. Thomson's reflecting galvanometer, failed to force a current of electricity through the insulator. Mr. Thomson's patents cover such a variety of preservative processes that sanitarians and hygienists will do well to consult him whenever an idea presents itself to their minds as to the applicability of his productions to their needs. Decorative wall-painting, to take the place of encaustic tiles at a cost of about 30 per cent. less, is another application of the patents, and a protector fluid enamel a further development of the original idea. This application renders metals, whether bright or unpolished, woods, gildings, marbles, paintwork, fancy leather goods and numerous other articles, impervious to the effects of atmosphere, and needs only sponging or washing to restore them to their pristine strength or appearance.

THE 'ANTISEPTIC APPARATUS.'

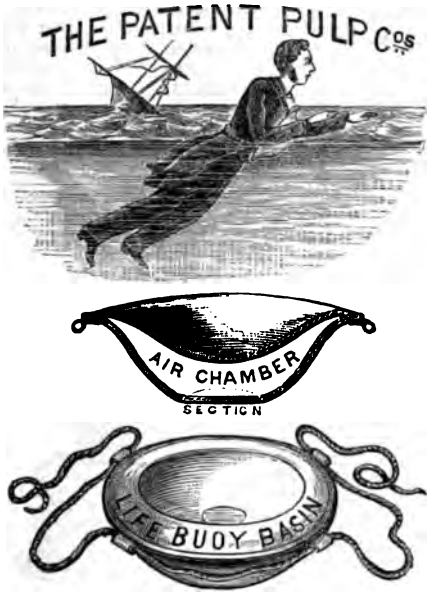
THE original proprietors of this meritorious invention having disposed of their interest in the patent, the new proprietors have opened a city warehouse at 41, Queen Victoria Street, E C., while retaining the original manufactory in the Harrow Road, and we take this opportunity of again calling the attention of our readers to it. We need not again go over the well-trodden ground, and point out how necessary it is that closets connected with sewers should always have a disinfectant at hand, by which the after-flush of water should be rendered harmless, while lying in the pan, from any contamination that may impregnate it, or from the exhalation of sewer gases into it. This is now acknowledged by all sanitary authorities, and the question only remains—Which is the best plan to adopt? Like all other arrangements where effect depends upon cause, an appliance of an automatic character, if well constructed, offers advantages over all others dependent upon individual action, that must in the end supplant them; and in a case like the one in point, where the health of a household will often be dependent upon the freedom from impurities in the closets, the 'antiseptic apparatus' is one of those contrivances that supplies the want. It consists of a copper cylinder that can be easily and cheaply attached



to any closet pan, inside the woodwork, without disturbing any of the existing arrangements, and is charged with a strong solution of permanganate of potash. As the plug descends, after being raised, it causes to be discharged into the water in the closet pan a charge of this solution. This necessarily mixes with the water, and effectually destroys all organic contaminations, sewer gas, etc., and what is of almost as much importance, the sewers themselves are constantly kept inoffensive, for where the 'antiseptic' permeates, danger from such infections as are brought about by exhalations from drains are rendered next to impossible. It is doubtless one of the most valuable, yet most simple, inventions of the day, and, we understand, is increasing extensively in demand.

VEGETABLE SUBSTANCES FOR DOMESTIC ARTICLES, LIFE SAVING, AND SANITARY PURPOSES.

SEVERAL attempts have been made during the last quarter of this century to utilise certain vegetable substances for domestic and other articles, and we look with the greatest interest on the advances that science has made in finding uses for many things that were formerly allowed to run to waste. The word 'pulp' can of course be applied to a variety of substances, but we have only to deal with it from the phase in which it affects our present argument. To go back to the origination of the material, we may find a solution in the ever-recurring desire to cheapen the cost of any existing article in demand, and singular as it may appear, perhaps, to some, paper tea-trays may be said to be the root from which this idea has sprung in this country. These articles, as originally made, were composed of successive sheets of brown paper pasted together, and subjected to heavy pressure, and so moulded to the required shape and thickness. Iron tea-trays afterwards entered into competition with paper, and the makers of the pasted paper by which the genuine article became designated to distinguish it from its imitative, sought about for a cheaper vegetable substance, having the attributes of the original, that could be produced at a lower price. Then came the introduction of 'pulp', applied to a material made of rags and we know not what substances, all reduced to a pulp mixed with water, afterwards dried, and eventually, like pasted paper, pressed into form and made into trays like the original. But it was found that this material had not the strength or consistency of pasted paper; its atoms were, so to speak, not homogeneous and did not present the cohesion of the original.



Nor could all the art of the japanner present such a smooth and even surface as in pasted paper. Later on it occurred to other minds to introduce domestic articles, such as wash basins and other articles, in a similar substance, but there has always been the one objection to them, that in case of a fall on the edges they would inevitably break or chip. The Patent Pulp Manufacturing Company of 79, Coleman Street, of whose productions we are about to speak, have apparently overcome this difficulty, and have also succeeded in introducing a substance with a much smoother face, which is effected by a process in the manufacture by which they are enabled to eradicate all water from the material. But apart from the many domestic articles the company are introducing, they must be commended *for turning* their attention in a direction hitherto lost sight of by those who have preceded them in a similar line of manufacture, and amongst other commendable features, a wash-basin for ship use has been so formed as to present a life-preserver that may take its place amongst the best appliances of the kind now in use. This article, of which we append an engraving, is formed with a hollow bottom and cords at the side. If every passenger on shipboard were provided with one of these basins, less loss of life would probably occur, as all that is required in case of accident is to sling it on to the breast, and on taking the water it will be found capable of sustaining the heaviest frame for an indefinite period. An article that is, so to speak, always at hand, and that can be utilised so readily for assisting in preserving life, cannot be too highly estimated, and if there were no other purposes to which the patent pulp could be applied, this alone would render it an admirable acquisition. But the company have found a scarcely less meritorious use for it, in rather a singular direction. This is its application to chamber utensils for lunatic asylums; and to those of our readers who are connected with such institutions, the advantages will be at once apparent. The danger attending the use of earthenware utensils is well known, and the breakage at times amounts to some dozens per week. The patent pulp ones present every advantage necessary. They are unbreakable. They are made without handles, which render throwing, perhaps, not quite so easy, and being very light, the danger attending this pastime whenever indulged in, is not likely to be attended with any serious results. There are probably other utensils suitable for such institutions that the patent pulp would be found advantageous for, and medical officers have only to intimate their requirements to the company to have them carried out. Passing to a totally different use, the patent pulp has been utilised for head gear, and the helmet as worn by the military appears to offer greater advantages than the felt prototype now in use. It is as light, smoother, and capable of being washed and retaining its original colour, and at the same time it is harder, and will resist heavier blows, and we see no reason why they should not come into general use as undress head gear. Before we conclude these remarks, there is one other purpose to which it has been applied that is worthy of notice, and that in the opinion of the patentees will open up a wide future for it; this is its applicability as a non-conductor in connection with the storage of electricity; and as an accumulator of this 'power' it has already been found a most effective agent. There are probably many other purposes of a sanitary or hygienic character to which this useful material may be applied with success.

THE VENTILATION OF STEAM SHIPS.

AN exhibition of ship's models and other appliances connected with ship-building has recently been held at the Fishmongers' Hall, under the auspices of the Shipwrights' Company; and in connection with it a prize of £50 was offered by Mr. Ex-Sheriff Burt for the best mode of ventilating passenger-going steam-ships. The competition was open to the world, but beyond two American systems recently introduced here, the only makers who entered the lists were English firms, and the prize was awarded to Messrs. Boyle and Son, of Holborn Viaduct and Glasgow.

Messrs. Boyle's new application is simply a modification of that introduced by them for the ventilation of houses or public buildings. The ventilation of a ship differs from that of a building in this respect, that in any arrangement for the purpose care must be taken that water can by no means enter the tubes, and in overcoming this difficulty lies the whole gist of Messrs. Boyle's modification. In this arrangement the inlet ventilator plays the most important part. Formed after the fashion of their ordinary inlet, it has four openings for the admission of fresh air, which converge into one when they enter the body of the ventilator. Near the deck line is an opening, which in the event of a sea being shipped allows the water to pass through and be discharged on it.

But this is only one part of the application. Inside the receiver of fresh air an oblong tube of a syphon character

duced. This takes the form somewhat of a com- l letter S, so placed ϖ, and this is connected at the ı with the tubes carried to the different rooms. : event of a sea being shipped, a portion of the would probably enter this tube, and it may be sup- would be syphoned into the fresh air-pipes. But guarded against in a most effectual manner. At the bend of this syphon are arranged a set of louvres, structed, that as fast as the water enters the tube it ırough the louvres, and out of the ventilator with the body, on to the deck by the opening before mentioned, r no possibility can any be forced upwards. In this arrangement lies the novelty of the invention, and ıly manner in which it differs from Messrs. Boyle's as applied to ordinary buildings. From the deck the ventilator, pipes are carried in the usual manner saloons, engine-room, or any part of the vessel ing ventilation, and vertical shafts are erected in these for the admission of the fresh air thus supplied, the d air being carried off in the usual manner by other communicating with their exhaust ventilators. As of these inlets and exhausts as may be considered ary can be fixed upon deck, and in such positions as be either inconvenient or an eyesore, as they can be of an ornamental character wherever fancy dictates it. thus be seen that the whole apparatus is automatic action, and mechanical action, wherever it can be sed with, should give place to automatic, but more larly so on shipboard, where it is more likely to e ineffective for such a purpose than on land.

is usually the case in all competitions for prizes, xception appears to have been taken to the ruling of ors, and we believe one of the American gentlemen m we have referred, a Mr. Green, considered that had not been done to his invention. The gentlemen m was entrusted the unthankful office of making the s, we understand, with that courtesy that is generally led to a stranger under such circumstances, listened to jection, but on further consideration became more ly convinced that their decision was correct, a fact hould enhance the value of the award in Messrs. s eyes. The Duke of Edinburgh, we are informed . Boyle, spent some time in examining the invention, was tested by models, and expressed himself highly d with its action and arrangement. We may further lthough it is scarcely necessary, as sailing passenger ıre so rapidly disappearing, that a simple mechanical may be easily added to these ventilators to produce ent of air in the case of calms in hot climates.

THE VENTILATION OF DRAINS.

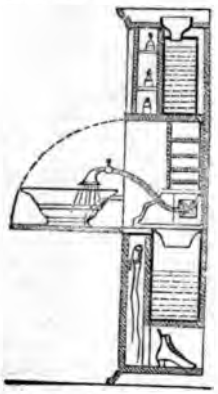
GST the different appliances for the ventilation of , to prevent the escape of sewer gas into our houses, fore us, there is one of which at present comparatively s known beyond the inventor's own *clientèle*, but , we believe, destined at no distant date to take a position amongst its prototypes. The inventor and ee, Mr. Thomas Bate, of the Town Hall Chambers, m, a surveyor and estate agent, as well as a sanitary er, holding a prominent position in his district, and lso builds extensively, has adopted one of the most ıal, though perhaps rather tardy means of making vention known. The ventilators, of which we subjoin g:aving of the exhaust cowl, are fitted to all his ; thus occupiers have an immediate and practical tunity of testing their value, and, so far, in every ce they have given entire satisfaction. It must be stood that the cowls are not intended for chimneys, nly for the ventilation of drains. The drawing ıts a fair elevation of the exhaust cowl or ventilator, , however, requires some little description to explain ion. Inside the outer or overhanging cone is a r one, having an air way or chamber between it and ıter one, and between it and the pipe, which latter is d to a level with the interior cone. Both of these are supported on radial projecting wings, against the wind impinges, and the whole form a powerful exhaust pump for the elimination of the sewer gases. On the top of the outer cone, both of which are open, is fixed a cap or cover of wove wire gauze, shown in the engraving, and the whole is surmounted by a square canopy, supported by four legs, protecting the gauze from rain, etc. The action may be thus described :—An inlet cowl connected with a down shaft, about 2½ inches diameter, and communicating with the drain, must be fixed for the admission

of fresh air at one end of the building; and at the other a Potts's Edinburgh trap, or a Weaver's syphon ventilating trap, or some kindred appliance, is fixed in connection with the sewer, and this is connected with a 2½-inch up ventilating shaft carried to about three feet above the roof, and surmounted with a Bate's patent cowl, as already described, which completes the arrangements. Thus the fresh air enters by the inlet ventilator, is carried through the drains, and is then drawn up the exhaust and pumped out, so to speak, by the action of the cones before described. The most important novelty in Mr. Bate's invention is unquestionably the wire gauze covering for the prevention of down draught, and it is as ingenious as it is effective. He does not claim originality for the idea beyond the fact of its application to this purpose, as no doubt the Davy miners' lamp was in his thoughts when working out his invention.

To those acquainted with the value of Sir Humphrey's lamp its application to this invention will be appreciated, and we may add that we have been observers of severe tests, where an amount of artificial air has been attempted to be forced through the gauze, and with an anemometor fixed within a foot of the inlet that had no perceptible influence upon it, and we can scarcely imagine the possibility of a down draught affecting it under the most adverse circumstances, as however strong a wind may blow, it must necessarily be so broken up in forcing itself through the gauze wire as to be rendered harmless. The price of these cowls is also very moderate, and the entire cost of applying the apparatus to a house is so trifling as compared with the comfort and safety gained, that it should not be a matter of consideration to any one who studies the health of his family.

ILLUSTRATED SANITARY PATENTS.

3870. (1881.) WASHING AND TOILET CABINET: E. R. JOHNSON, LONDON. [6d.]—This invention consists in an improved portable toilet cabinet for the use of officers on board ship and elsewhere. It is compact, occupying little



room, contains within it all the necessaries of the toilets and may be so constructed that it can be taken to piece. for transport. The cabinet is constructed in three portions, The upper part contains a cistern for supply water, which may extend the whole depth of the cabinet, in which shelves would be fitted at the front of the cistern for toilet, medicine, or other bottles, and enclosed by doors. The middle portion is provided with a fall-down flap or front capable of being supported horizontally to form the wash-stand and toilet table. Upon this flap is fixed a basin which is tilted up in the act of raising or closing the front flap, and empties itself into a waste-water tank, contained within the lower part of the cabinet. The basin is fixed to the inner surface of the flap, by means of clips embracing the foot of the basin, and of studs and slots, by which the basin is held securely fixed, and may be removed when required. When not in use, the front flap is raised and closed, the basin being raised also into a vertical position, and received within the middle portion of the cabinet. The water supply-pipe from the cistern. The ball could be made of metal only, but would require careful fitting to the seat, and would be liable to be prevented from coming to a proper bearing by dirt, or it could be made of rubber only; but, in this case, I find that it is liable to get pressed out of shape, and so not make a secure seal, therefore I prefer the metal ball and soft seating.

3961. (1881.) CONSTRUCTION OF DRAINAGE FOR THE PURPOSE OF DESTROYING NOXIOUS GASES, ETC.: R. H. REEVES, PARKHURST, ISLE OF WIGHT. [6d.] Here the gas in the drain or sewer is trapped off into districts, so that the sewage flows through the drains freely, but the gas is confined to certain localities. The trapping may be done by means of a tongue descending into the drain below the surface of the sewage, the portion of the drain beneath the tongue or shutter being dished out, so as to ensure the gas being trapped off whenever there is sewage in the drain. This tongue may be either fixed or floating, so as to rise and fall with the sewage. The gas thus trapped off is drawn out from the drain by means of a fan, force-pump, or other exhausting apparatus, and thereby driven through a tank of water, by which means the various odours and vapour-poisons are destroyed, and thence into a purifying chamber containing disinfectants, which will destroy the noxious gas; it then passes harmlessly into the atmospheric air. The inlets for supplying fresh air in the place of the gas thus drawn out are placed at points of the drain as far as possible from the exhausting apparatus, their size being regulated according to their distance from the apparatus, the smallest inlet being the nearest to it. Fig. 4 shows the method in which the invention is practically applied to sewers. The communication with the external atmosphere is shown at H, H, through the grating in the roadway I; K is a chamber built over the apparatus to afford convenient access to it from the roadway. Fig. 5

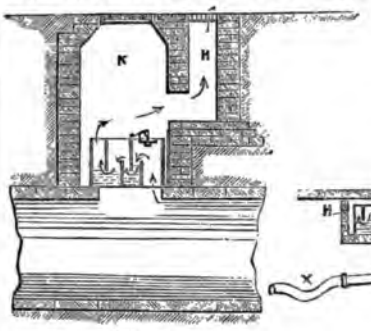
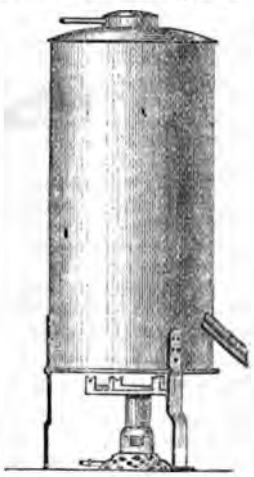


FIG. 1. FIG. 2.

shows an application of the invention to the drain of a private house, and needs no further description. The trapping off of the gas is caused by the dip in the drain-pipe at X.

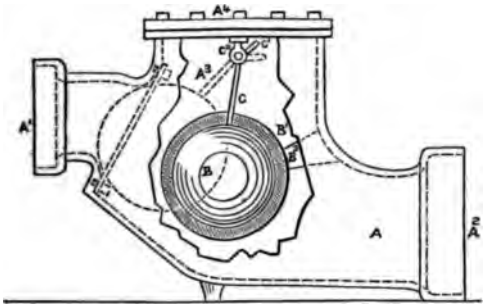
3968. (1881.) IMPROVED APPLIANCES FOR HEATING WATER FOR DOMESTIC AND OTHER PURPOSES, INCLUDING AN IMPROVED GAS-BURNER, WHICH IS ALSO AVAILABLE FOR OTHER HEATING PURPOSES: F. T. BOND, M.D., ETC., GLOUCESTER. [8d.]—The object of this invention is to provide for the heating of water for domestic



or other purposes in such a way that it may be heated in a continuous stream, either to its boiling point, or to any temperature short of that point, and to do this with as little waste of heat as practicable. There are other improvements specified. This patent must be studied in its entirety, in order to realise the advantages claimed by the inventor. The advantages are numerous, and the apparatus is so constructed as to burn a mixture of coal-gas and atmospheric air at will.

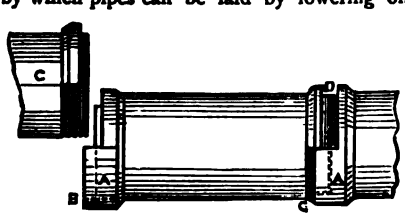
4115. (1881.) IMPROVEMENTS IN FLOOD-VALVES FOR DRAINS AND THE LIKE: FREDK. DYER, CAMDEN TOWN, LONDON. [6.]—The object of this valve is to prevent the inroad of high tides into buildings through the drain-pipes, and it should be fixed to the drain between the building and outfall. The valve will be best understood by reference to the accompanying drawings; A is the valve-chamber, made of cast-iron, earthenware, or the like, and having an intake branch A^1 at a higher level than the outfall branch A^2; the outfall branch may, with advantage, be made larger than the intake branch, and is shown thus in the drawing. A hollow ball B, preferably of copper, covered with an India-rubber coating B^1 hangs by an arm C freely

from a joint C^2 at the portion A^3 of the chamber A, or the joint may be attached to the movable cover A^4. The tail C^1 of the arm C projects at an inclination upward, so as to come in contact with the cover A^4 or part of the joint before the arm C has dropped to a perfectly vertical position. The same result may be attained by providing a lug or projection B^2 within the chamber A for the ball or arm to rest



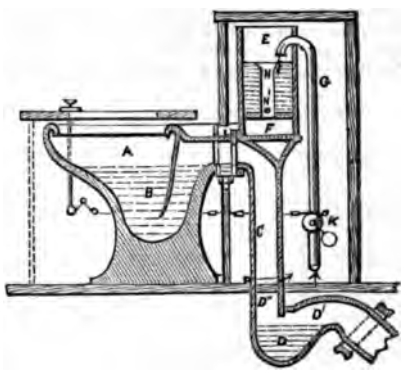
against. The joint C^2 may either be screwed into the cover, or the arm C may be attached to a horizontal rod extending across the orifice under the cover A^4, and taking bearings in lugs upon each side of the upper portion A^3 of the chamber A. A seating ring D of brass, vulcanite, or other incorrodible material (or such as is not easily corrodible) is placed upon the inner end of the intake branch A^1; this is turned true, and forms a seating for the ball to fit into when raised. The branch A^1 may be formed separate from the main body, and bolted on, or the whole may be made in one piece; in the former case the seating ring would be placed between the flanges, as shown in Fig. 2; in the latter it would be bolted on inside, as shown in Fig. 3. As difficulty is sometimes experienced in applying the rubber coating B^1, an ordinary ball of copper, or the like, may be substituted, and the seating ring D be formed of soft material for it to bed against. The action is as follows: The tide or flood backing up the drain enters the outfall branch A^2, rises in the chamber, and floats the ball B, which, as the water rises, approaches the intake branch A^1, and finally beds firmly upon the seating ring D, thus effectually closing the orifice, and preventing the water entering the building. By reason of the arm C being always slightly inclined towards the intake branch A^1, there is no danger of the ball sticking with the arm vertical, or of its moving the wrong way, the tail C^1, or the lug B^2, preventing that. When the water subsides again the ball falls with it, unsealing the branch A^1, and leaving a clear passage. The chamber should be considerably larger than the ball, so as to leave plenty of room for the passage of soil, etc. The ball is larger than the seating ring, so as to obviate any danger of its jamming in the seating. If the chamber A be made of earthenware, or other incorrodible material, the seating ring may, if desired, be dispensed with, and the seating be merely turned true.

4,427. (1881.) IMPROVEMENTS IN PIPE-JOINTS: E. J. MAWBEY, MARKET HARBOROUGH. [6d.] The invention consists of a new method of forming joints in pipes, by which pipes can be laid by lowering one pipe



vertically into another directly into its intended position in work, instead of pushing the end of one pipe into the other, and by bedding it solidly into the jointing material previously placed around the invert of the socket. There is a half band made round the upper half of the spigot end of the pipe, corresponding with the upper portion of the socket end, which together form a dove-tail shaped groove, which groove is to be filled solid with the jointing material. Two small studs are made on the invert of the socket to keep the pipes in true line. The invention is performed by covering the whole of the invert of the joint and the edges of the pipe at A and B, with a layer or coating of Portland cement or other jointing material; then bedding the pipe C, C, by lowering it into the invert A, A, in the manner shown. Fill up the space D, D with Portland or other cement, and place a fillet of cement around the edge of the lower half of the socket, as shown by dotted lines at G.

4,551. (1881.) IMPROVEMENTS IN WATER-CLOSETS: GEO. E. WARING, JUN., NEWPORT, RHODE I., UNITED STATES. [6d.] The action of this closet is as under. The water chamber E is empty, the pan A is full to its point of overflow between B and C, and the weir chamber is full to its point of overflow at D'. The handle I being lifted, the cock K is opened, and water rushes through the supply-pipe G into the chamber E, much more rapidly than it can escape through the hole H'. The chamber being filled, it overflows at H, and passes through the compartment F into the pan A. Water rises in the limb B, overflows through C, raises the water level in the weir chamber D until it reaches the lower end of the discharging limb at D'', and imprisons the air of the syphon. The flow into the pan A continuing, the movement of water through this confined atmosphere continues, and carries with it, as its delivery increases, an increased volume of this confined atmosphere, until a strong syphon action is established, withdrawing from the pan A not only the water which it originally contained, and which may have been fouled by use, but also the clean water flowing from the chamber E. When the emptying of the pan is indicated by the suction of air at the intake of the limb B, the handle I is dropped, and the water-supply is shut off. The air taken into the syphon when the pan became emptied arrests the syphon action, the contents of the pipe G fall into the weir chamber



D, and overflow into the soil-pipe, and the contents of the receiving limb B fall back and seal the intake. The pan A is now slowly filled by the discharge of the contents of the chamber E through the hole H'. The weir chamber discharges its surplus water over the overflow D', and unseals the vent at D'', so that there can be no further withdrawal of water from the pan A until a sufficient volume of water is delivered into it to cause another sealing of the vent D''. This can take place only when the supply-valve K is again opened, or when water in considerable quantity is delivered into the pan A by other means. For the lowering of the water level in the weir chamber D, he does not wish to confine himself to a depression of the overflow point D'; this point may be higher than the lower end of the discharging limb, and the contents of the weir chamber D may be lowered by the action of a subsidiary siphon leading from the weir chamber over the point H, and delivering to the outlet.

4,696. (1881.) MAKING JOINTS OF WATER, GAS, OR SEWAGE, PIPES: J. A. EATON, C.E., LONDON. [6d.] These pipes are without sockets, and are used in the fol-

lowing way. Having taken two spigot-pipes, *a*, *a*, he slips a loose socket *b* over one of them, and having placed the pipes in conjunction, he places, if necessary, a thin strip of yarn *e*, or other material, at junction of pipes, and then

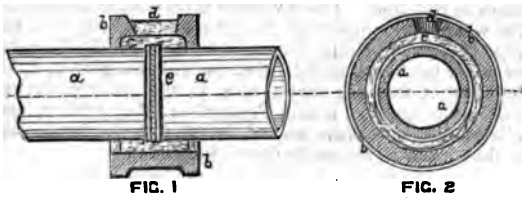
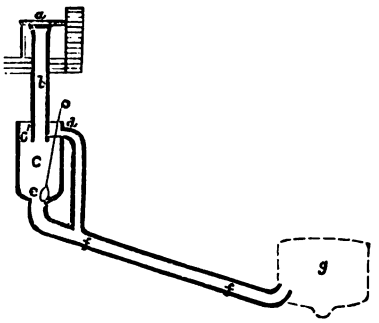


FIG. 1 FIG. 2

places the loose socket or collar in the position shown in Fig. 1, and having put the usual band of clay or rope at ends of socket as *f*, *f*, he pours in the sealing (*c*) material through the hole *d*, and when cool removes the clay or rope *f*, *f*, and the joint is complete. A similar operation is performed in making a joint with sheet metal socket, with the addition of revolving one of the eccentric discs, *h*, into the position shown in Fig. 9. This invention enables a perfectly tight joint to be formed, and will effect considerable economy, both in the construction of pipes and in the cost of freight and carriage; and he claims as novel in this invention especially the use of the loose sockets or collars, In a filter, the combination, with an earthenware vessel constructed as described, for joining pipes of the construction described, used in conjunction with quick setting and non-contracting substances, such as Spence's metal, Hutchinson's metalloid.

4,598. (1881.) PRIVY WATER-CLOSETS: DR. J. FINCK, BADEN-BADEN. [6d.] This invention has for its object to render closets, sometimes called privies, perfectly inodorous, and to remove the excrements from houses or towns to convenient distances without permitting any fermentation to take place, thereby preserving in the said excrements all their manurial qualities for agricultural purposes, partly separating, if required, the liquid excrements from the solid. *a* is the seat of the closet; *b*, the soil-pipe descending into a chamber *c*, which is filled with water to the level of the overflow *d*, at the side of the chamber.



The water is arranged to stand at such a level as to cover the lower end of the soil-pipe *b* to a depth from 5 to 15 centimètres, and thus hermetically seal it. In the inclined bottom of the chamber is an opening which is closed by a tightly-fitting stopper *e*, and when this is removed from its seat, by a rod or cord, allows the contents of the chamber to escape into the conduit *f*, leading into a drain or cesspool, or receiver *g*, or to any other suitable outlet. The conduit *f* receives also the matters which overflow by the overflow-pipe *d*. It will be understood that the excrement discharged into the chamber *c* by the soil-pipe *b* floats upon the water, and escapes by the overflow-pipe *d* into the pipe *f*, leading to the cesspool or outlet, but the hermetical joint formed by the soil-pipe *b* dipping into the water in the chamber *c* prevents the entrance of gases into the water-closet or into the soil-pipe. At any desired intervals of time, the stopper *e* may be drawn away from its seat, the whole of the contents of the chamber *c* is thus rapidly discharged, carrying before it any matter which may previously have lodged in the conduit *f*. The stopper *e* is then allowed to fall on to its seat, and the chamber *c* is again filled with water to the top of the overflow *d*.

SANITARY JOTTINGS.

The Hexham Local Board and Urban Sanitary Authority have increased the rate from three shillings to three shillings and fourpence in the pound for the ensuing year; this is exclusive of the water-rate of sixpence in the pound.

The Alnwick and Canongate Local Board and Urban Sanitary Authority, Northumberland, have increased the salary of the Clerk from £50 to £70 per annum.

At Irlingborough, Northamptonshire, a meeting of owners and ratepayers has been held, and a resolution passed that it is expedient that the parish should be constituted a Local Government District.

The Prince and Princess of Wales have formally opened New Abbey Park, Leicester, which has been laid out by Messrs. Barron and Son, of Derby, at the cost of the Corporation. The outlay has been about £50,000, and the park is tastefully laid out and planted with a numerous variety of plants.

Of late years the firm of Steven Brothers and Co., of Glasgow and Upper Thames Street, have been devoting their energies extensively to architectural and ornamental iron-work. Their most recent effort of a public character in this department of their extensive business has been the manufacture in cast-iron of a very elaborate band stand for the new park at Wolverhampton, which has been presented to the park trustees by the much respected senior member for the borough, the Right Hon. C. P. Villiers. The stand has been erected at a cost of £340, of which sum the iron-work represents £225, the stone-work and flooring £78, and the painting £37. The canopy, like the stand, is of cast-iron, and octagonal on plan. It is dome-shaped in elevation, the profile, or outline, being to the curve known as the ogee. The frame-work on which the covering plates are fixed consists of eight cast-iron ribs, each springing from a column, and joined together at the top to the strong cast-iron base plate of terminal. Between each pair of ribs, and attached thereto by bolts and nuts, are four angle-iron purlins. Each of the cast-iron roof-covering plates is securely fastened to the ribs and purlins, and the roof is surmounted by an ornamental cast-iron weather vane. The whole rests on eight strong ornamental cast-iron columns, 16 feet high, each column having three ornamental spandril brackets attached, two of which are set at the angle answering to the shape of the stand, and, with the corresponding bracket on the next column, form an arch, enriched and made secure by having an ornamental fret panel, of the full length of the bay, fixed on the top. The third bracket projects out from the stand in a line with the main rib, and supports the overhanging roof and eaves. A ceiling of varnished pitch pine is fixed immediately above the line of the top of the columns which acts as a sounding board. An ornamental railing, 3 feet 9 inches high, fixed to each of the columns, encloses the structure, and on one side a double-leaved gate is hung to plain wrought-iron standards. The total height to the top of the vane is about 35 feet, the diameter over pillars being 20 feet, and over the eaves 28 feet. Partaking somewhat of the Italian style, this new addition to park adornment and town property has a very pleasing appearance, which is much aided by the artistic decorative painting and gilding of Mr. Hartill, of Worcester Street. Although Wolverhampton is situate on the verge (so to speak) of that busy hive of industry known as the Black Country, lying between it and Birmingham, and her denizens have freer access to the country than those of some of the adjoining towns, the attractions of a park, almost in her midst, will prove of inestimable advantage and a source of pleasure to her toiling artizans that cannot fail to be appreciated. We understand the band stand has given great satisfaction to the Mayor, Committee, and all concerned in the development of the park.

APPOINTMENTS UNDER THE PUBLIC HEALTH ACT.

Medical Officers of Health.

Atkinson, Joseph, L.K.Q.C.P. Irel., L.R.C.S. Irel., has been appointed Medical Officer of Health for the No. 2 division of the Teesdale Rural Sanitary District, county Durham, at £27 5s. per annum.

Davies, David, M.R.C.S. Eng., has been re-appointed Medical Officer of Health for the Stapleton Urban Sanitary District, at £25 per annum

Earle, Beresford Nathaniel, M.D., San. Sci. Cert. Cantab., has been re-appointed Medical Officer of Health for the New Winchester Rural Sanitary District, at £125 per annum for three years from 24th June.

Grindrod, John Albert, M.R.C.S.Eng., has been re-appointed Medical Officer of Health for the Norden Urban Sanitary District, Lancashire, at £20 for one year from the 25th inst.

Lompray, Francis Hamilton, L.R.C.P. Edin., L.F.P.S. Glasg., has been appointed Medical Officer of Health for the Nos. 1 and 3 divisions of the Teesdale Rural Sanitary District, at £47 15s. per annum.

Hughes, John, F.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Carmarthen Urban Sanitary District, at £80 per annum for three years.

Jackson, Daniel, M.D., has been re-appointed Medical Officer of Health for the Hexham Urban Sanitary District, Northumberland, at £30 for one year.

Keir, William Ingram, L.R.C.P.Edin., L.R.C.S.Edin., has been appointed Medical Officer of Health for the Melksham Urban Sanitary District, at £25 for one year, *vice* Whiteley, whose appointment has expired.

Kerswill, John Bedford, M.R.C.P.Edin., has been appointed Medical Officer of Health for the St. Germans Rural Sanitary District, Cornwall, at £100 for one year

Nash, William Gunner, M.R.C.S.Eng., L.S.A.Lond., has been appointed Medical Officer of Health for the Daventry Rural Sanitary District, at £40 for one year, and for the Daventry Urban Sanitary District, at £10 for one year, *vice* Haviland, resigned.

Quick, John, M.R.C.S. Eng., L.S.A. Lond., has been re-appointed Medical Officer of Health for the Penzance Rural Sanitary District, at £80 per annum.

Saunders, Charles Edward. M.D.Aberd., San. Sci. Cert. Camb., has been re-appointed Medical Officer of Health for the Barnet, Berkhampstead, Hemel Hempstead, Watford, and Welwyn Rural, and Barnet, East Barnet, and Tring Urban Sanitary Districts, at £460 per annum for five years.

Wigge, Thomas Nathaniel, M.R.C.S.Eng., has been appointed Medical Officer of Health for the Southern Division of the Ashbourne Rural Sanitary District, Derbyshire, at £25 per annum.

Warren, Thomas, M.R.C.S.Eng., L.S.A.Lond., has been appointed Medical Officer of Health for the Aylesbury Rural Sanitary District, at £100 for one year, *vice* Keene, resigned.

Surveyors, Clerks to Guardians, Inspectors of Nuisances, etc.

Barley, Mr. Mark, has been appointed Surveyor and Inspector of Nuisances to the Castleton-by-Rochdale Local Board and Urban Sanitary Authority, at £80 per annum, *vice* Wolstenholme, deceased.

Barney, Mr. Thomas, has been appointed Treasurer to the Nuneaton Guardians and Rural Sanitary Authority, *vice* Fisher, resigned.

Bartlett, Mr. R. V. O., has been appointed Inspector of Nuisances for the East Medene Sub-district of the Isle of Wight Rural Sanitary District, at £125 per annum.

Benson, Mr. Robert Telford, has been appointed Clerk to the Wigton Guardians and Rural Sanitary Authority, Cumberland, at £75 per annum as Clerk to the Guardians, £15 per annum, as Clerk to the Rural Sanitary Authority, £15 per annum as Clerk to the Assessment Committee, and £10 per annum as Clerk to the School Attendance Committee, *vice* Mandnell, deceased.

Berry, Mr. James, has been appointed Inspector of Nuisances and Collector to the Swinton and Pendlebury Local Board and Urban Sanitary Authority, at £75 per annum, *vice* Hardy, resigned.

Buxton, Mr. A., has been appointed Inspector of Nuisances for the West Medene Sub-district of the Isle of Wight Rural Sanitary District, at £125 per annum.

Chamberlin, Mr. Charles Frederick, has been appointed Clerk to the Burton-on-Trent Guardians and Rural Sanitary Authority, at £160 per annum as Clerk to the Guardians, and such further remuneration as Clerk to the Rural Sanitary Authority, and to the Assessment and School Attendance Committees, and for conducting the elections, as may be fixed at end of the first year, *vice* Coxon, resigned.

Clark, Mr. William, has been appointed an Inspector of Nuisances and Surveyor for the Bakewell Rural Sanitary District, Derbyshire, at £130 per annum.

Cloutmann, Mr. W., has been appointed Surveyor to the St. George Local Board and Urban Sanitary Authority, Gloucestershire, at £100 per annum, *vice* Dawson, appointed to the Leyton Local Board and Urban Sanitary Authority, Essex

Corner, Mr. Charles William, has been appointed Treasurer to the Prescot Local Board and Urban Sanitary Authority, and to the Prescot Guardians and Rural Sanitary Authority, Lancashire, *vice* Chrimes, resigned.

Cutter, Mr. Tom, has been appointed Clerk to the Chesterfield Guardians and Rural Sanitary Authority, at £150 per annum as Clerk to the Guardians, and such salary as may be voted from time to time as Clerk to the Rural Sanitary Authority and School Attendance and Assessment Committees, with fee for conducting the Elections of Guardians. *vice* Hastlehurst, resigned.

Dawson, Mr. William. has been appointed Engineer and Surveyor to the Leyton Local Board and Urban Sanitary Authority, Essex, at £350 per annum, *vice* Ashbee, resigned.

Doe, Mr. George, has been appointed Clerk to the Torrington Guardians and Rural Sanitary Authority, at £100 per annum as Clerk to the Guardians and Assessment Committee, £15 per annum as Clerk to the Rural Sanitary Authority. and £15 per annum as Clerk to the School Attendance Committee, *vice* Glubb, resigned.

Gill, Mr. William, has been appointed Surveyor and Inspector of Nuisances to the Royton Local Board and Urban Sanitary Authority, Lancashire, *vice* Bleasdale, who previously held the dual offices of Clerk and Surveyor, and who retains that of Clerk.

Glass, Mr. Robert, has been elected chairman of the Whickham Local Board and Urban Sanitary Authority, Co. Durham, *vice* Reed, resigned.

Hallam, Mr. J. W., has been re-appointed Inspector of Nuisances for the Crickhowell Rural Sanitary District, at £100 per annum, until the 25th March 1883.

Haynes, Mr. Josiah Edward, has been appointed Inspector of Nuisances and Surveyor of Highways for the Faversham Rural Sanitary District, at £250 for one year, *vice* Thomas, whose appointment has expired.

Howland, Mr. William Watts, has been re-appointed Surveyor and Inspector of Nuisances to the Thame Local Board and Urban Sanitary Authority, Oxfordshire, at £60 for one year.

Jones, Mr. David, has been appointed Treasurer to the Lampeter Guardians and Rural Sanitary Authority, Cardiganshire, *vice* Williams, deceased.

Jones, Mr. John, has been elected a Member of the Christchurch Local Board and Urban Sanitary Authority, Monmouthshire, *vice* Hall.

Jones, William Lewis, L.R.C.P.Edin., L.F.P.S.Glasg., has been re-appointed Medical Officer of Health for the Llandilofawr Rural Sanitary District, at £50 for one year.

Millington, Mr. John, has been appointed Surveyor, Collector, and Inspector of Nuisances, to the Wirksworth Local Board and Urban Sanitary Authority, Derbyshire, at £100 per annum, *vice* Webster, resigned.

Myatt, Mr. John, has been appointed Surveyor to the Leek Improvement Commissioners and Urban Sanitary Authority, at £150 per annum, *vice* Frost, resigned.

Roberts, Mr. Daniel, has been re-appointed an Inspector of Nuisances and Surveyor for the Bakewell Rural Sanitary District, at £130 per annum.

Sargeant, Mr. James Albert, has been re-appointed Inspector of Nuisances for the West Cowes Urban Sanitary District, and for the Cowes Port Sanitary District, at £60 per annum, until the 25th March 1883.

Williams, Frederick, M.R.C.S.Eng., L.S.A.Lond., has been re-appointed Medical Officer of Health for the Launceston Rural Sanitary District, at £30 for one year.

Witts, Mr. J W., has been appointed Inspector of Nuisances and Surveyor for the Market Harborough Rural Sanitary District, at £130 for one year, *vice* Wright, resigned.

NOTICES OF MEETINGS.

SANITARY INSTITUTE OF GREAT BRITAIN.

At the annual general meeting, held at 9, Conduit Street, on Wednesday, May 17th, Prof. F. S. B. F. De Chaumont, M.D., F.R.S., in the chair, a favourable report was presented by the council on the progress made by the institute during the past year. The chairman gave an address, and the officers for the ensuing year were elected, the president being His Grace the Duke of Northumberland; trustees, Sir John Lubbock, Bart., D.S.L., F.R.S., Dr. B. W. Richardson, F.R.S., and Thomas Salt, Esq.

EXAMINATIONS FOR LOCAL SURVEYORS AND INSPECTORS OF NUISANCES.

At an examination held by the Sanitary Institute of Great Britain, on June 8th and 9th, thirteen candidates presented themselves. The questions were set to be answered in writing on the 8th, and the candidates were examined *vivâ voce* on the 9th. The Institute's certificate of competency to discharge the duties of Local Surveyor, was awarded to Frank Hubber and J. W. Witts, and the Institute's certificate of competency to discharge the duties of Inspector of Nuisances, was awarded to H. Abrams, W. Atkins, J. Baxter, Samuel C. Fairchild, A. Finlay, T. Lightfoot, G. Steers, Noah Wright.

An exhibition of gas-cooking and heating apparatus is to be held at Brussels in August and September next, under the auspices of the Belgian Association of Gas Engineers.

NOTES AND QUERIES.

21.—Sewer Air.

In reference to Query No. 7, Record Notes and Queries, April Number, I have seen sewer gas bubbling up through water in a trap with about half-an-inch seal. The trap was in a yard, ground floor, one water-closet on second floor discharging into drain-pipe, from which the trap-pipe branched off. W. J. Henry.
1, Pembridge Gardens, Bayswater.

22.—Sewer Air.

The danger of sewer-gas entering underground tanks may be met by means such as shown in accompanying rough sketch. Communication with the drain is completely cut off. During the rainy season, the depth of water in the tank is inspected through G.
1, Pembridge Gardens, Bayswater. W. J. Henry.

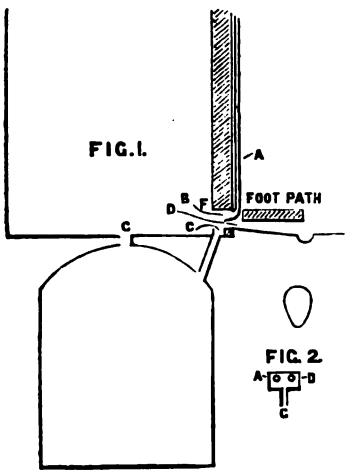


Fig. 1.—A, rain-water pipe; B, recess about 1 ft. 3 in. by 1 ft. 6 in. in thickness of wall. Pipe A discharges into this recess. Wooden plugs are fitted in the openings, C, D, by which the water is let into the tank, or run off to the street gutter, E. Flap door at F closes recess.
Fig. 2.—Cross section of recess showing positions of A, D.

23.—Hand-Books of Sanitation.

should be glad if you would inform me which is the best book on Sanitation, and one which would be of use to a Sanitary Medical Officer. R. H. W.

[Good books for your purpose are Dr. George Wilson's *Hand-Book of Hygiene*, published by J. & A. Churchill, New Burlington Street, and A. Wynter Blyth's *Dictionary of Hygiene and Public Health*, published by Charles Griffin & Co., Stationers' Hall Court.]

24.—Birmingham Sanitary Officers' Association.

Can you give me the name and address of the Secretary of the Birmingham Sanitary Officers' Association? J. K.

[Mr. Thomas H. Dale, C.S.I., Winson Green Road, Birmingham.]

25.—Discharge from Sewers.

I was lately told by an engineer that the formula given at page 374 of *Parkes' Hygiene*, edited by Professor du Chaumont (5th edition, 1878), for the calculation of discharge from sewers, was incorrect. Can you tell me in whom to put my trust—my dead teacher or my living friend? Eblana.

[Your critic is perhaps a fastidious one. The formulæ he alludes to appear to be right. If he wishes to consult other authorities, Latham's work upon *Sanitary Engineering* and J. Bailey Denton's work upon the same subject will give him several formulæ. He might consult, also, the *Minutes of Proceedings of the Inst. of C. E.*, vol. xii, p. 55; or the published *Table of Velocities, etc.*, and quantities discharged by sewer pipes, by Isaac Shone, published by Spon, Charing Cross. Authorities vary in the resultants of their formulæ. Take an example, in which is required to find the velocity of water issuing from a pipe 6 inches in diameter and 400 yards long, the outlet being 60 feet below the inlet. Answers would run as follows. Weisbach, 7.25; Chezy, 7.9; Eytelwein, 7.39; Hughes, 7.9; Prony, 7.27; Blackwell, 7.57, and so on.]

26.—Ventilation of House Drains.

1. Would you consider the drain of a house properly ventilated under the following conditions? The soil-pipe, which is at back of house, is carried up above roof, to act as ventilator, and is not trapped at foot. The sewer runs through gardens at back of house, and not through road in front, as usual in London. Would you, under the above circumstances, advise the introduction of a fresh air inlet-pipe, and should this be inserted in drain (running through house to front scullery) in front area, and should pipe be carried to roof, or how can the bad gases likely to be emitted be prevented from entering windows?
2. Where there is a sufficient fall, should a syphon be inserted between house and sewer, whether house drains are ventilated or not? Do parochial authorities allow syphons to be inserted in house drains at the point of outlet to sewers? Is there any trap made that is better than an ordinary syphon for this purpose, and that is more certain to keep back rats, and to prevent gas from sewer entering the house drains when under pressure?
3. Are there any means of ascertaining if a trap or syphon is inserted in a house drain without opening ground all through, and can it be ascertained whether all joints are sound without opening ground all through? H. G. B.

[1. It does not matter where the inlet of fresh air is placed, so that it be placed between the house drain and the sewer; and it can very well work in connection with a soil-pipe ventilated the full diameter up to the top of roof, and remote from chimneys and windows, the soil-pipe being untrapped at the foot.]

[2. A proper siphon is always necessary between a house drain and the sewer, and parish authorities never object to them, provided their rules are complied with.]

[3. Yes; engineering experts have each their own means of testing whether there are traps in the line of drain, and whether the drains may be accepted as sound.]

[This is a set of queries not suited to our Journal, owing to their pointed nature. To answer them completely would require a proper plan, drawn to scale. We should advise our querist to submit the whole thing to an engineer, and to follow his advice, because whatever answers we may give, however correct they may be, we cannot be held responsible for them, seeing that they may be wrongly interpreted by a workman. Action should only be taken in such cases after the receipt of proper plans and specifications, furnished by competent professional men, and it is impossible to render complete answers to questions relating to other than 'principles of drainage'.]

27.—A Batch of Queries.

1. What is the best material for a soil-pipe for fixing inside a house, and what for outside?
2. In providing a ventilating-pipe, carried above roof, and an inlet-pipe, should an exhaust cowl be fixed in the former, to create a current in *one* direction? and if not, should the inlet-pipe be carried above the roof, or how else can the emission of bad air from inlet-pipe be safely prevented or made unobjectionable; and does the mica valve referred to in 'Sins of the Plumber' effect this, and what is its cost and action? If these two pipes are carried to a considerable height, is the circulation of air impeded? Does 'inlet ventilation at *lower* end of the drain mean at the point nearest the sewer?
3. Is it objectionable to make a soil-pipe as sole ventilator?
4. Can you name any book published on sanitation, giving in plain language the most efficient mode of draining London houses, in accordance with present-day scientific principles; and also giving directions for re-modelling old-style drains at moderate cost.
H. G. G.

[1. Lead for both inside and outside. Iron contracts and expands at the joints, and should not, at all events, be used inside a house.]

[2. As a rule, exhaust cowls are not necessary to create a current. Sometimes, however, when the ventilating-pipe is outside the house, or when the drain which it ventilates is longer than the height of the ventilating pipe, a cowl is considered by most people useful. With a proper disconnection chamber, and a properly ventilated drain, the mica valve inserted before the inlet would always close, should there be any return draught, which latter is a rare thing, and lasts only for a second.]

[3. If the soil-pipe were in the centre of the house-drain, and any closets beyond, it would be necessary to erect another ventilating-pipe at the far end of drain, taken up to a sufficient height.]

[4. No published book could possibly cover such an extent of information required. It could deal with principles only. Books are only useful in imparting sound information; and a house ought no more to be treated from book-lore than a family should be dosed from a pharmacopœia out of the library book-case.]

28. Mortality Statistics Tables.

The Urban Sanitary Authority of the Borough of Barnstaple have desired me, their Medical Officer of Health, to furnish them with a monthly Report, containing, I presume, particulars such as were contained in the 'Mortality Statistics Table' published in the Sanitary Record during the year 1880. I shall be obliged by your informing me if it is possible to obtain printed forms of the Tables, such as I can use for the purpose required; or perhaps you can refer me to other places where such monthly reports are made to the Authority by the Health Officer. M. O. H.

[We know of no printed forms which would be suitable for the preparation of a monthly return of vital statistics. Such monthly returns are, however, furnished to the Sanitary Authority of nearly all towns having a population exceeding 10,000 persons. The Medical Officers of Salford and Sheffield both furnish returns which appear to embrace most of those details that should find place in the monthly return which our correspondent is now called upon to furnish.]

29. Handbooks of Vital Statistics.

May I ask if you can recommend any work, in English, French, German, or Italian, which gives an explanation of such an amount of vital statistics, both theoretical and practical, as is sufficient for a Medical Officer of Health? That the ordinary authorities are not very clear on this subject is shown, I think, by the article written by you in 1879, when you pointed out Wilson's error in estimating the population. The *Lancet*, too, of May 20th points out, at page 853, that Parkes is not clear on the subject of expectation of life.
Eblana.

[We are not aware of any hand-book to vital statistics which deals theoretically and practically, with the subject in a manner to meet the requirements of Medical Officers of Health. Nearly all the works dealing with public hygiene contain some reference to statistics, but none that we have seen, even when free from error, treat the subject in a satisfactory manner.]